

### 423.1 DESCRIPTION

This work consists of the design, construction, and subsequent removal of falsework, formwork, temporary retaining structures and other related temporary works.

### 423.2 MATERIALS (Not Specified)

### 423.3 CONSTRUCTION REQUIREMENTS

**A. Design of Temporary Works:** The design of falsework, formwork, temporary retaining structures and other related temporary works is the responsibility of the Contractor. The design shall conform to the latest edition of the AASHTO "Guide Design Specification for Bridge Temporary Works."

**B. Bridge Falsework:** Falsework plans and design calculations for bridges shall be prepared by an Engineer registered in the State of South Dakota and submitted to the Bridge Construction Engineer for review at least 30 days prior to construction of falsework. No falsework construction shall be done until the Engineer's review has been made and all deficiencies have been addressed. The review of the falsework plans by the Engineer shall not relieve the Contractor of any responsibility for safely and adequately designing and constructing falsework.

Falsework shall be constructed in accordance with the reviewed falsework plans. If during falsework construction, site conditions are such that changes to the falsework are required, new falsework plans shall be submitted to the Bridge Construction Engineer for review prior to continuing construction of the falsework.

**C. Cofferdams Cribs and Shoring:** Cofferdams, cribs and shoring for foundation construction shall be carried to adequate depths and heights, be safely designed and constructed, and be made water tight as necessary for the proper performance of the work. When the bottom of the excavation is of sandy or porous material, which will not permit the footing to be poured in the dry, the excavation shall be sealed in accordance with Section 423.3.D. The interior dimensions of cofferdams and cribs shall give sufficient clearance for the construction of forms, the inspection of the cofferdam and crib interiors, and permit pumping outside of the forms.

Cofferdams or cribs which are tilted or moved laterally during the process of sinking shall be righted, reset, or enlarged to provide the necessary clearance at the expense of the Contractor.

Cofferdams, cribs and shoring shall be constructed to protect fresh concrete against damage from sudden rising of the stream and to prevent damage to the foundation by erosion. Timber or bracing that extends into the substructure concrete shall not be left in the cofferdams or cribs. After completion of the substructure, cofferdams, cribs and shoring, including all sheeting and bracing, shall be removed without disturbing or otherwise damaging the finished concrete.

**D. Foundation Seals:** A foundation seal shall not be used unless specified on the plans or approved by the Engineer. If the necessity for a foundation seal is due to inadequate or improper cofferdam construction, the Engineer may order the removal and/or reconstruction of the cofferdam or permit the placing of a foundation seal at the expense of the Contractor.

When a foundation seal is specified on the plans, the construction of the foundation seal shall be in accordance with these specifications unless otherwise specified on the plans.

When no foundation seal was specified on the plans, it shall be the responsibility of the Contractor to design the foundation seal in accordance with the AASHTO "Guide Design Specifications for Bridge Temporary Works" and submit the foundation seal plans to the Bridge Construction Engineer for approval.

Unless otherwise specified in the plans, the Contractor shall submit a foundation seal concrete mix design for approval. Foundation seal concrete shall be placed in accordance with Section 465.3.M and shall be placed up to the elevation of the bottom of the footing elevation, unless otherwise approved by the Engineer. The pumping of water from the interior of any foundation enclosure shall be done without moving water through any freshly placed concrete. Pumping will not be permitted during concrete placement or for at least 24 hours thereafter, unless it can be done from a suitable sump, which separates fresh concrete from the water.

Dewatering of the foundation enclosure may proceed when the foundation seal concrete has attained sufficient strength to withstand the hydrostatic pressure. After dewatering, all laitance or other unsound material on the top of the foundation seal shall be removed by scraping, chipping or other approved methods prior to placing the footing.

#### **E. Formwork:**

- 1. Wood Forms:** Forms shall be designed, built, and maintained to sustain the pressure and weight of the concrete and construction loads. The design of the forms shall take into account the effect of vibration of the concrete as it is placed.

Forms and form lumber shall be clean and in good condition. Lumber that is split, warped, bulged, marred, or that has other defects shall not be used.

Forms for concrete surfaces shall be constructed to produce mortar tight joints with smooth even concrete surfaces. Forms shall be filleted at all sharp corners and shall be given a bevel or draft in all projections, such as girders and copings. The required strength and smoothness may be obtained by lined forms or metal forms.

Metal ties and anchorages within the forms shall be constructed to permit placement without injury to the concrete. If ordinary wire ties are permitted, all wires shall be cut back at least 1/4 inch (6 mm) from the face of the concrete after the forms are removed. Fittings for metal ties shall be designed so on removal, the resulting cavities will be the smallest practical size.

Forms shall be set and maintained true to the line designated. When forms appear to be unsatisfactory, either before or during the placing of concrete, the work shall be stopped until the defects have been corrected.

Forms shall be surface treated with an approved form oil, or saturated with water, immediately before placing the concrete. For members with exposed faces, the forms shall be

surface treated with an approved form oil to prevent the adherence of concrete. Material, which will adhere to or discolor the concrete shall not be used.

2. **Metal Forms:** The requirements for wood forms, in regards to design, mortar tightness, filleted corners, beveled projections, bracing, alignment, reuse, and oiling shall apply to metal forms. The metal used for forms shall be of such thickness that the forms will remain true to shape. Bolt and rivet heads shall be countersunk. Clamps, pins, and other connecting devices shall hold the forms rigidly together and allow removal without injury to the concrete. Metal forms, which do not present a smooth surface or line up properly, shall not be used. Special care shall be exercised to keep metal forms free from rust, grease, and other foreign matter, which will discolor and contaminate the concrete.

- F. Removal of Temporary Works:** Unless otherwise specified on the plans or approved by the Engineer, all temporary works, except foundation seals, shall be removed. The removal of temporary works shall be done in such a manner that no damage occurs to the structure. The removal of falsework and formwork shall be in accordance with Section 460.3.P and 460.3.Q.

#### 423.4 METHOD OF MEASUREMENT

No field measurement will be made for any temporary works unless otherwise specified in the plans.

#### 423.5 BASIS OF PAYMENT

- A. Bridge Falsework:** No separate payment for bridge falsework will be made. All costs involved in designing, constructing and removing bridge falsework shall be included in the contract unit price for the bridge deck concrete.
- B. Cofferdams, Cribs and Shoring:** No separate payment for cofferdams, cribs and shoring will be made unless otherwise specified on the plans. All costs involved in designing, constructing and removing cofferdams, cribs and shoring shall be included in the contract unit price for Class A Concrete.
- C. Foundations Seals:** No separate payment for foundation seals will be made. All costs involved in designing and constructing foundation seals shall be included in the contract unit price for Class A Concrete.
- D. Formwork:** No separate payment for formwork will be made. All costs involved in designing, constructing and removing formwork shall be included in the corresponding contract item(s) for concrete.

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