

500 STRUCTURES

ITEM 503 - EXCAVATION FOR STRUCTURES

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503.01 Description. This work consists of designing cofferdams and shoring, and excavating of materials not removed under other items of work that must be removed to enable construction of bridges, and other structures. Included in this item are (a) constructing, maintaining and subsequently removing of cofferdams, cribs and shoring, (b) dewatering and backfilling the excavation, (c) protecting the excavation against collapse, and (d) disposal of materials not required or not suitable for backfill.

503.02 Classification. Excavation is classified as unclassified excavation, unclassified excavation including rock (or shale), or rock (or shale) excavation.

503.03 Cofferdams, Cribs and Sheeting. This item includes the preparation of a plan, construction, maintenance and subsequent removal of all cofferdams, cribs, sheeting, shoring, bracing or other materials necessary to safely support the sides of excavations, embankments, adjacent buildings, tracks or other premises, and all pumping necessary to complete required construction.

Construct cofferdams, cribs, and sheeting such that wales and crossbraces, if practical, clear the top of the footings by at least 1 foot (0.3 m). If this is not practical, construct this bracing using structural steel and leave it in place. If bracing is to be left in place and the ends would not be visible when the structure is completed, burn off the steel ends flush with the concrete surface. If ends would be visible, box back the steel ends at least 6 inches (150 mm) from the concrete face, and burn off the ends at least 3 inches (75 mm) back of the concrete face. Completely fill the resulting holes with concrete.

Where water is not encountered, the Contractor may place sheeting at the plan dimension of the footing and as forms for footing concrete. Leave this sheeting in place at least to the top of the footing or properly separate it from the footing concrete so that the sheeting may be removed without damaging the concrete.

Where water is encountered, and cofferdams are necessary, construct them practically watertight before excavating below water level. Make provision outside the footing to drain, collect and remove water. When placing concrete, keep the excavation dewatered until the concrete is above the prevailing water level. Effectively protect footing concrete from erosion. If using a concrete seal to stop the flow upward from bottom of a cofferdam, place the seal below the planned footing and consider it a part of the cofferdam. The City will not pay for a seal unless it is specifically called for on the plans.

Design and construct cofferdams, cribs, and sheeting to accommodate a water elevation 5 feet (1.5 m) above the Normal Water Elevation shown on the plans.

503.04 Protection of Excavation. Cut the sides of all excavations to prevent caving or protect the excavation from caving. Do not disturb the material below the bottom of footings. Perform blasting in a manner that avoids damage to the material supporting the structure vertically or laterally and that avoids subsequent slides that damage the structure, road or adjacent property. If the material below the bottom of footings not supported by piles is disturbed, remove it and fill the entire space with concrete at no expense to the City. Under footings supported by piles, replace and compact the over-excavated or disturbed material. If backfilling is necessary to correct caving or slides, backfill according to Section 503.10.

Excavation adjacent to railroad tracks subject to the supervision of the involved railway company. Provide sufficient bracing to ensure the proper support of the roadbed and tracks.

503.05 Footings in Rock. Where rock or shale excavation is a separate pay item, fill the portion of excavation into rock or shale that is below the top of footing with concrete. If removing rock or shale as part of unclassified excavation and the footing is designed to be keyed into bedrock, confine the excavation into bedrock for the minimum specified depth of keying within the area bounded by the outer edge of the footing. Fill excavation outside of these limits and within and below keyed depth with concrete.

503.06 Approval of Foundations. Notify the Engineer when the excavation is to be completed to the depth shown on the plans. Do not place footings until the Engineer has approved the subfoundation.

503.07 Culvert Foundations. The Contractor may place cast-in-place or precast box or 3-sided culverts directly on solid rock, if rock exists for the full length of the culvert. If boulders, unstable material, and rock exist for portion of the length, remove and replace them with suitable compacted material for a depth the Engineer determines, but in no case less than 6 inches (150 mm) below the bottom of the culvert. Remove rock and boulders for a width sufficient for placing and proper compaction of the backfill. Remove unstable material on each side of the culvert for a width generally equal to the span of the culvert, but not less than 2 feet (0.6 m).

503.08 Disposal of Excavation Material. Dispose of excavated material not needed or not suitable in accordance with all current provisions of the Ohio Water Pollution Control Act (OWPCA) (ORC Chapter 6111). Use other suitable excavated material for backfill.

503.09 Backfill. Backfill under this item includes all replaced excavation and new embankment adjacent to structures. Use backfill materials conforming to Item 203.02 and 203.03. Place and compact the backfill materials according to Item 203.06 and 203.07, except as modified in this section.

Do not place backfill material against any structural element until the Engineer has approved the element.

In bridge abutments, compact backfill material is to meet the compaction requirements in Item 203.07. Elsewhere, compact backfill materials to 95 percent of maximum laboratory dry density.

When a test section method is used for compaction acceptance: Use compaction equipment with a total weight or a centrifugal force of least one ton (0.9 metric ton). Supply the manufactures information to verify this information. Use at least six passes to construct the production areas. Use at least 97 percent of the test section maximum dry density for acceptance of the production areas.

The Contractor does not have to place backfill around piers that are not within the embankment area, or adjacent to roadway or a railway in thin layers or compact it, but should leave the backfill material in a neat condition with a compensation allowance made for settlement.

Backfill in front of abutments and around piers to the ground lines shown on the plans.

Backfill all structural foundation units as soon as practical after the required conditions of 503.09 are met to avoid the ponding of surface water and the accumulation of debris. Simultaneously backfill in front of and behind abutments, piers, wing walls, and retaining walls.

Carefully backfill against waterproofed surface to avoid damage to the waterproofing material.

503.10 Method of Measurement. After the requirements of Items 201, 202, and 203 have been met, the City will measure the volume of Excavation as follows:

- A. Bounded on the bottom, by the bottom plane of the footing, crossbeam, or wall.
- B. Bounded on the Top.

1. In cut sections, by the surface of the remaining ground.
 2. In fill sections:
 - (a) If excavation is performed before embankment is placed, by the surface of the original ground.
 - (b) If excavation is performed after embankment is placed, by the surface of the embankment.
- C. Bounded on the Sides.
1. For unclassified excavation, 1 foot (0.3 m) outside the outer edge of the footing, crossbeam, or wall.
 2. For Rock Excavation or Shale Excavation:
 - (a) *If “Rock Excavation: is included in the contract, by the outer edge of the footing or wall.*
 - (b) If the rock or shale is removed as part of Unclassified Excavation including Rock and/or Shale:
 - (1) above the minimum specified depth of keying the same as C.1 above.
 - (2) for the remainder of the excavation, the same as C.2.a above.
 - (3) For unstable material under culverts, by the limits of removal as specified.

For abutment excavation quantities, the City will include material removed above the bench (if any), in front of the vertical plane described in C.1 above, and by the finished slope of the cut or embankment.

For keys below footings, the City will determine the volume of keys by the number of cubic yards (cubic meters) shown on the plans.

The City will include culvert excavation and backfill between the surface of the original ground, the flow line of the culvert, and 1:1 slopes from the outer face of the culvert with 203 quantities. This item governs the remaining culvert excavation and backfill. The City will measure Unclassified Excavation by the lump sum where specified in the plans.

The City will measure Cofferdams, Cribs, and Sheeting by the lump sum.

503.11 Basis of Payment. *If the contract item Cofferdams, Cribs, and Sheeting is not included in the contract, the City will pay for cofferdams, cribs, and sheeting under the contract unit price for excavation.*

The elevations shown on the plans for the bottoms of footings and cast-in-place box culverts shall be considered as approximate. When excavation below plan elevation for footings is required, the 3 feet (0.9 m) immediately below the plan elevation within the lateral limits defined by 503.01 shall be paid for at the unit price bid for the class of excavation.

Where cofferdams are a separate pay item, the lump sum price shall be considered as including any extra cost involved for cofferdams for additional depth up to 3 feet (0.9 m) below plan elevation. Excavation deeper than 3 feet (0.9 m) below plan elevation and the additional cofferdams necessitated by this excavation may be provided for as extra work, as described in 109.04.

Add fill material and perform subsequent excavation as required to provide the minimum cover over culverts to accommodate heavy earth moving equipment shall be provided at no expense to the City.

The City will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
503	Lump Sum	Cofferdams, Cribs and Sheeting
503	Cubic Yard (Cubic Meter)	Unclassified Excavation
503	Lump Sum	Unclassified Excavation
503	Cubic Yard (Cubic Meter)	Unclassified Excavation including Rock
503	Cubic Yard (Cubic Meter)	Unclassified Excavation including Shale
503	Cubic Yard (Cubic Meter)	Unclassified Excavation including Rock and/or Shale
503	Cubic Yard (Cubic meter)	Rock Excavation
503	Cubic yard (cubic meter)	Shale Excavation