

Payment will be made under:

Item No.	Pay Item	Pay Unit
2031000	Unclassified Excavation	Cubic Yard
2031200	Site Excavation	Lump Sum
2032000	Rock Excavation	Cubic Yard
2033000	Borrow Excavation	Cubic Yard
2034000	Muck Excavation	Cubic Yard
2035000	Station Grading	Station
2036000	Geotextile for Separation of Subgrade and Subbase or Base Course Material	Square Yard

SECTION 204

STRUCTURE EXCAVATION

204.01 Description. This work shall consist of the removal and satisfactory disposal of all materials necessary for the construction of foundations and substructures for bridges, box culverts, and other structures when the plans or proposal indicate an item of structure excavation. Work performed shall conform to the lines, grades, dimensions and sections as shown on the plans or as otherwise directed by the Engineer; and shall be performed in the manner and subject to the conditions and requirements hereinafter provided.

Excavation for structures shall include furnishing materials for construction, shoring, sheeting, cribbing and cofferdams (when not itemized in the proposal), and performing all pumping, bailing, draining, backfilling, removal of all bracing, and the disposal of surplus or unsuitable materials.

204.02 Classification. Excavation for structures, except for

box culverts and foundations for bridges shall be unclassified. Unless otherwise provided for on the plans or in the special provisions, excavation for structures performed in connection with foundations of box culverts and bridges shall be classified as follows:

- a. Structure Excavation for Culverts shall include all materials excavated as necessary for the construction of reinforced concrete box culverts, subject to the limits stated herein.
- b. Dry Excavation for Bridges shall include all materials excavated above the water elevation shown on the plans, except as modified under Rock Excavation.
- c. Wet Excavation for Bridges shall include all materials excavated below the water elevation shown on the plans and above the foundation, except as modified under Rock Excavation.
- d. Wet and Dry Excavation for Bridges shall include all materials excavated when the water elevation is not shown on the plans, except as modified under Rock Excavation.
- e. Rock Excavation for Bridges shall include all hard rock as specified in Subsection **203.08**. Should a price for Rock Excavation be included in the proposal, then all material meeting the specifications for Rock Excavation will be classified as such wherever found. All other materials will remain unclassified, except Wet Excavation for Bridges, Dry Excavation for Bridges, and Wet and Dry Excavation for Bridges. In the event that no price is called for in the proposal for Rock Excavation, all materials encountered shall be classified as wet, dry, or wet and dry excavation without other classification.

CONSTRUCTION REQUIREMENTS

204.03 General. All materials excavated for structures shall be used insofar as suitable and practicable in backfilling around the structure and in the formation of embankments as specified in these specifications, or shall be otherwise disposed of as directed by the Engineer.

The Contractor shall notify the Engineer a sufficient time in advance of the beginning of structure excavation so that the cross-sectional elevations and measurements may be taken of the existing ground and structure. Any materials removed or excavated before such measurements have been taken may not be paid for.

The placing of concrete or masonry in any foundation excavation shall not be started until the Engineer has examined and approved the depth of the excavation, the suitability of the foundation, and the control of the water and pumping operations.

Changes in elevation of footings or foundations for structures shall be in accordance with the provisions of Subsection **105.02**.

204.04 Preparation of Foundations. Where practicable, foundations shall be excavated to the outline of the footings shown on the plans and shall be of sufficient size to permit the placing of the full width and length of the footings shown or indicated. Round or undercut corners and edges of footings will not be permitted.

- a. Rock. All rock or other hard foundation shall be freed from all loose material, cleaned and cut to a firm surface either level, stepped, or serrated, as may be directed by the Engineer. All seams shall be cleaned out and filled with concrete, cement mortar, or grout.

b. Other Materials. When concrete is to be placed on a foundation surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and the fine grading of the foundation to grade shall be made just prior to placing the reinforcing and concrete.

204.05 Cofferdams

A. General. When the project plans require the use of cofferdams for construction of bridge substructure or other elements of work the cofferdams shall comply with the following requirements:

1. Cofferdam units shall consist of the complete cofferdam required to construct the desired element and must be constructed of heavy structural timber and/or structural steel as a minimum.
2. Materials used to construct a cofferdam shall remain the property of the Contractor and shall be removed in accordance with Subsection **204.05C**.
3. The Contractor shall comply with Subsection **702.10** in the design and inspection of cofferdams.
4. When included as a bid item in the proposal, the unit price bid for each cofferdam shall be full compensation regardless of the actual volume of cofferdam constructed.
5. The type of cofferdam (i.e. Type 1, Type 2, etc.) shown in the proposal is based on the theoretical plan volume of the cofferdam and is used by the Department for estimating purposes.

B. Construction. Cofferdams or cribs for foundation construction shall in general be carried well below the bottom of the footings and shall be well braced and of

such construction as will permit them to be pumped free of water and kept free until all concrete below water has reached its initial set. Except where seals are called for on the plans, the interior dimensions of cofferdams shall be sufficient to give clearance for the construction of forms, the inspection of their exteriors, to permit pumping, and handling of leakage outside of the forms. They shall also be so constructed as to protect green concrete against damage from a sudden rising of the stream and to prevent damage to the foundation by erosion. Bracing shall not be left in cofferdams or cribs in such a way as to extend into the substructure, without permission of the Engineer.

Cofferdams or cribs that become tilted or have moved laterally shall be righted or enlarged to provide ample clearance and this shall be performed without extra compensation.

C. Removal. Unless otherwise provided, the Contractor shall remove cofferdams or cribs with all falsework, sheeting, and bracing after completion of the substructure. The removal shall be effected in such a manner as not to disturb or mar the finished structure.

204.06 Foundation Seal. When in the opinion of the Engineer, conditions are encountered that render it impracticable to de-water the foundation before placing the concrete, he may allow the construction of a concrete foundation seal. Before placing the seal, the foundation shall be cleaned of all objectionable material to the satisfaction of the Engineer.

The foundation for a concrete seal with foundation piling shall be excavated sufficiently below grade to take care of any "heave" in groundline due to the driving of foundation piles and also to permit backfill of sand or aggregate to sufficient thickness if considered necessary by the Engineer to avoid contamination of the fresh seal concrete by mud. The elevation of the foundation thus prepared shall be within 6 inches

of the grade shown on the plans or as established by the Engineer. Earth material in the arched web of the steel sheet piling shall be completely removed so that the seal concrete will be in contact with the sheeting at all areas.

The foundation for a concrete seal without foundation piling shall be leveled to within a 5% grade in any direction from one edge to the opposite edge by blasting if necessary and permitted. Earth material, loose rock and small boulders shall be removed.

The seal concrete shall be constructed as prescribed in Subsection **702.17**, and after it has cured sufficiently, the cofferdam shall be de-watered, the seal thoroughly cleaned of all laitance and other objectionable materials and the balance of the concrete placed in the dry. Unless the plans or Special Provisions provide for seals, such concrete shall be placed entirely at the expense of the Contractor, except as provided for below. If a seal is authorized by the Engineer, as provided for in the first paragraph of this section, the Contractor will be paid at the unit price for Concrete Class 4000S for that portion of pier shaft, not actually cast, but that would have been required had the bottom of the footing been placed at the elevation of the bottom of the approved seal.

When weighted cribs are employed and the weight utilized to partially offset the hydrostatic pressure acting against the bottom of the foundation seal, special anchorage, such as dowels or keys, shall be provided to transfer the entire weight of the crib into the foundation seal. When a foundation seal is placed under water, satisfactory steps shall be taken to keep the water level the same on the outside and inside of the cofferdam, so as to prevent pressure on fresh concrete due to a difference in head.

204.07 Pumping. Pumping from the interior of a foundation enclosure shall be done in such a manner as to preclude the possibility of any portion of the concrete materials being carried away. No pumping will be permitted during the placing of

concrete, nor for a period of at least twenty-four (24) hours thereafter, unless it is done from a suitable sump separated from the concrete work by a reasonably watertight wall.

Pumping to dewater a sealed cofferdam shall not commence until the seal has set sufficiently to withstand the hydrostatic pressure and in no case, in less than three (3) days or such additional length of time as the Engineer may direct.

204.08 Backfill. Backfill for structures shall conform to the requirements of Subsection **205.03**.

204.09 Permanent or Temporary Sheet Piling.

A. Description. This work shall consist of designing, furnishing, installing, maintaining, and removing temporary sheet piling wall at the locations shown on the plans. The sheet piling wall may be, but is not limited to one of the following types:

- a. Steel sheet pile wall - braced or tieback.
- b. Steel soldier piles with lagging - braced or tieback.

B. Design. Sheet pile walls shall be designed in accordance with the latest edition of the AASHTO Standard Specifications for Highway Bridges with interim specifications, and the applicable requirements of Subsection **702.10**.

The Contractor shall submit design calculations, methods of construction, and detailed drawings, all bearing the seal of a South Carolina Professional Engineer for review by the Engineer twenty-one (21) days before construction of the wall.

C. Construction. The sheet piling wall shall be constructed in a manner which protects any existing bridge, existing roadway or railway, and existing traffic, while d-

lowing construction access for new construction. All bracing or tiebacks used must provide access for new construction, while maintaining the existing traffic flow without interruption.

Any wood lagging used shall be in accordance with Section **706** of these specifications.

204.10 Method of Measurement.

A. Excavation For Bridges Excavation for bridges will be measured in cubic yards and shall be the volume actually removed between the original elevation of the ground surface and the bottom of the footings, but will not include material removed outside of an area which is bounded by vertical planes 18 inches outside of and parallel to the neat dimensions of the footings, except where specifically authorized in writing by the Engineer. In the case of permanent structural members such as struts, diaphragms, beams, etc, where it is necessary to excavate in order to place forms, such excavation will be included in the volume of structure excavation to be paid for. However, the limits of the paid excavation will not extend more than 12 inches horizontally beyond the sides of the members, nor more than 12 inches below the bottom of the members. Where the excavation begins below the waterline, it shall be measured from the bottom of the watercourse to the bottom of the foundation, thus excluding any measurement of water.

Where a foundation seal and excavation for bridges are included in the plans, the measurement of excavation shall be the volume in cubic yards of material other than water between the bottom of the watercourse and the actual bottom of seal concrete as poured and within the vertical planes of the neat lines of the seal shown on the plans.

B. Excavation For Reinforced Concrete Box Culverts.

Excavation for box culverts will be measured in cubic yards, and shall be the volume actually removed between the original elevation of the ground surface and the bottom of the bottom slab, but shall be limited to the volume that is enclosed by vertical planes located 2 feet outside of and parallel to the outside neat lines of the culvert barrel and extending to 2 feet beyond the ends of the wingwalls. This excludes the measurement of excavated material for the wings that is outside the area described above. Measurement of unstable material removed as directed by the Engineer as provided in Subsection **203.12** will not be limited to the area described above. Measurement will not be made for water or other liquid removed.

Material for backfilling necessary due to the removal of unstable material below grade that is obtained from the roadway or material pits will not be measured separately, but will be included in the measurement of Unclassified Excavation. Material necessary for backfilling that is obtained from sources other than the roadway and material pits will be considered as being equal to the volume of the unstable material removed and measured as provided in Subsection **203.15**. No direct allowance will be made for overhaul or shrinkage for material to backfill undercut areas.

C. Excavation For Other Structures Excavation for other structures to be paid for under this section when such excavation is indicated on the plans or in the proposal, will be measured in cubic yards and shall be the volume actually removed between the original elevation of the ground surface and the bottom of the footing, but shall be limited to the volume that is enclosed by vertical planes located 12 inches outside of and parallel to the neat lines of the footings. Measurement will not include water or other liquid removed.

D. Cofferdams. When included as a bid item in the proposal, cofferdams shall be measured by each cofferdam

constructed and de-watered in accordance with the plans. No adjustment will be made for differences between theoretical and actual volume of the cofferdam constructed.

E. Temporary Sheet Piling. Measurement of Temporary Sheet Piling shall be for the actual horizontal length in linear feet of temporary sheet piling wall in place and accepted by the Engineer.

F. Permanent Sheet Piling. Measurement of Permanent Sheet Piling shall be the actual square yards of permanent sheet piling wall in place and accepted by the Engineer.

204.11 Basis of Payment. The quantities determined and classified as provided above will be paid for at the contract unit price for Dry Excavation, Wet Excavation, Rock Excavation, and/or Wet and Dry Excavation for Bridges, or Structural Excavation for Retaining Walls as the case may be, which price and payment shall be full compensation for all labor, materials, equipment, cofferdams, cribs, caissons, sheeting, pumping, bailing, draining, caulking and other items or incidental work that may be necessary to the successful completion of the excavation to the depth indicated on the plans.

If it is found necessary to carry a footing more than 5 feet, but 10 feet or less, below the plan elevation for any individual footing, payment for excavation work performed below the elevation of waterline within these limits will be made at a unit price equal to 150% of the contract unit price for the applicable classification of excavation.

If it is found necessary to carry a footing more than 10 feet below plan elevation for any individual footing, payment for excavation work performed below the elevation of waterline will be made at a unit price equal to 200% of the contract unit price for the applicable classification of excavation. The price and payment shall include the cost of removing cofferdams, cribs, sheeting, backfill, and disposing of surplus material. Excavation will be paid for under one classification only and

no allowance will be made for necessary re-excavation.

Excavation for box culverts including the removal of unstable material for box culverts will be paid for at the contract unit bid price for Structure Excavation for Culverts. Excavation for the necessary backfill material obtained from sources outside the limits of the roadway and material pits will be paid for at the contract unit price for Structure Excavation for Culverts.

Payment for cofferdams will be at 100% of the contract price for each cofferdam of each type when the cofferdam is de-watered. This price and payment shall be full compensation for all labor, design, equipment, and materials necessary to place, de-water, maintain, and remove the cofferdam.

The accepted length of temporary sheet piling wall shall be paid for at the contract unit price for Temporary Sheet Piling, which price and payment shall be full compensation for all materials, design, installation, maintenance, removal, and other items or incidental work for the temporary sheet pile wall.

Permanent sheet piling wall will be paid for at the contract unit price for Permanent Sheet Piling, which price and payment shall be full compensation for all labor, materials, design, installation, and other items or incidental work that may be necessary to the successful completion of the permanent sheet pile wall.

Payment for each item includes all direct and indirect costs and expenses required to complete the work.

Payment will be made under:

Item No.	Pay Item	Pay Unit
2041000	Structure Excavation for Culverts	Cubic Yard
2041005	Structure Excavation for Retaining Walls	Cubic Yard
2042000	Dry Excavation for Bridges	Cubic Yard
2043000	Wet Excavation for Bridges	Cubic Yard
2043500	Wet & Dry Excavation for Bridges	Cubic Yard
2044000	Rock Excavation for Bridges	Cubic Yard
2045000	Cofferdam	Each
2045010	Cofferdam - Type 1 (0 – 10,000 CF)	Each
2045020	Cofferdam - Type 2 (10,001 – 20,000 CF)	Each
2045030	Cofferdam - Type 3 (20,001 – 30,000 CF)	Each
2045040	Cofferdam - Type 4 (30,001 – 40,000 CF)	Each
2045050	Cofferdam - Type 5 (40,001 – 50,000 CF)	Each
2045060	Cofferdam - Type 6 (>50,000 CF)	Each
2047000	Temporary Sheet Piling	Linear Foot
2047200	Permanent Sheet Piling	Square Yard

SECTION 205

EMBANKMENT CONSTRUCTION

205.01 Description. This work shall consist of the formation of embankments in accordance with these specifications and in reasonable conformity with the lines, grades and cross-sections indicated on the plans or established by the Engineer, and shall include preparation of the areas upon which