

## SECTION 206 - EXCAVATION AND BACKFILL FOR CONDUITS AND STRUCTURES

206.01 Description. This work includes: \*

(1) excavation to the depth and lines established for the foundations of culverts, bridges, and other structures; \*

(2) the excavation of trenches for culverts and pipes (including water and sewer lines), cutoff walls for slope paving and concrete aprons, footings and end returns and cutoff stubs for riprap; \*

(3) other excavation specifically designated in the contract as structure excavation; \*

(4) backfilling according to this section and Section 624 - Water System and Section 625 - Sewer System; \*

(5) disposal of surplus material from the structure excavation; \*

(6) bailing, draining, sheathing and the construction of cofferdams, if found necessary, and the subsequent removal of sheathing and cofferdams. \*

Excavation for structures does not include the excavation: \*

(1) of post holes for fences, gates, or similar items; \*

(2) necessary to properly set curbs, paved gutters, headers, pavement or base course forms; nor \*

(3) needed to place properly hand-laid riprap or grouted rubble paving. \*

206.02 Materials. Materials shall conform to the following: \*

Filter Material 703.18

Structure Backfill Material 703.20

Trench Backfill Material 703.21

206.03 Construction Requirements.

(A) General. The Contractor shall notify the Engineer ten (10) working days before excavation for structures, so that the Engineer can take cross-sectional elevations and measurements of the undisturbed ground. \*

The Contractor shall excavate foundations to the elevations according to the particular type of structure the Contractor places. \*

The Contractor shall not disturb the ground below the elevations \*  
 shown in the contract in structure excavation operations. If the \*  
 Contractor disturbs such ground below the required elevations, the \*  
 Contractor shall excavate the disturbed ground until the Contractor \*  
 reaches the undisturbed ground. The Contractor shall backfill this area \*  
 with Class D concrete until the Contractor reaches the required \*  
 foundation footing elevation. This work shall be at no cost to the State. \*

The Contractor shall keep the foundation dry according to the \*  
 contract by draining, bailing, pumping, driving sheathings or \*  
 constructing cofferdams and cribs. \*

When the material from excavation does not meet the quality \*  
 requirements specified for the backfill, the Contractor shall furnish \*  
 such suitable material as required. \*

The Contractor shall use or dispose surplus and suitable material \*  
 from structure excavation remaining after the Contractor completes \*  
 backfilling according to Section 203 - Excavation and Embankment. \*

**(B) Cofferdams.** The Contractor shall carry cofferdams for foundation \*  
 construction well below the bottom of the footings. The Contractor shall \*  
 brace well and as watertight as practicable. The Contractor shall provide \*  
 the interior dimensions of cofferdams sufficient clearance for driving \*  
 piles, constructing forms and, when placing no seal, to permit pumping \*  
 outside the forms. \*

If the clearance provided in the contract between the outside line \*  
 of the footing and piles or interior wall or surface is not sufficient to \*  
 permit the driving of piles or building of forms, the Contractor may \*  
 provide such clearance. The Engineer will consider such enlargement over \*  
 one (1) foot outside the dimensions of the footing shown in the contract \*  
 for the sole purpose of expediting the work of the Contractor and is of \*  
 no value to the State. The Engineer will not include such excavation \*  
 and backfill for payment. \*

The Contractor shall correct or enlarge cofferdams that are tilted \*  
 or moved out of position during the process of sinking. Such work shall \*  
 be at no cost to the State. \*

In tidal waters or in streams at a time of probable flood, the \*  
 Contractor shall vent cofferdam walls at low water elevation to insure \*  
 full hydrostatic head both inside and outside the cofferdam during the \*  
 period of pouring and setting of seals. \*

The Engineer will not permit shoring in cofferdams that will induce \*  
 stress, shock, or vibration in the permanent structure. \*

If permitted, cross struts or bracing may extend through foundation \*  
 concrete. The Engineer will permit such struts or bracing below low water \*  
 to remain in place. The Contractor shall remove struts or bracing above \*

low water. The Contractor shall fill the volume with concrete of the same mix as that specified for the surrounding concrete. \*

The Contractor shall submit drawings showing the proposed method of cofferdam construction and other details left open to its choice or not fully shown on the contract for substructure work. The type and clearance of cofferdams shall be subject to acceptance. \*

The Contractor shall remove the cofferdams with sheathing and bracing to the level of the streambed at no cost to the State after the completion of the substructure. The Contractor shall do such removal as not to disturb or mar the finished concrete or masonry. \*

**(C) Foundation Treatment.** The Contractor shall uncover the rock fully when footing concrete or masonry is to rest upon rock. The Contractor shall remove the surface to a depth sufficient to expose sound rock. The Contractor shall level off the rock roughly or cut and roughen to approximate horizontal and vertical steps. \*

The Contractor shall grout seams in rock under pressure or otherwise treated as ordered. The Engineer will pay the cost as extra work according to Subsection 104.03 - Extra Work. \*

The Contractor shall not disturb the bottom of the excavation when using no piles and footing concrete or masonry is to rest on an excavated surface other than rock. The Contractor shall not make the final removal of the foundation material to grade until just before the Contractor places the concrete or masonry. \*

The Contractor shall complete the excavation for piers and abutments to the bottom of the footings before driving piles therein. The Contractor shall remove excess materials remaining in the excavation after pile driving to the elevation of the bottom of the footings. \*

The Engineer will permit the Contractor to excavate a sufficient distance below the bottom of the footing as shown on the contract at no cost to the State when using piles. If the ground has risen above plan grade after driving the piles, the Contractor shall remove the surplus material at no cost to the State. If the surface of the ground is below plan grade after driving the piles, the Contractor shall backfill and compact to the plan grade with acceptable material at no cost to the State. \*

**(D) Inspection.** If the Engineer needs to determine the character of the foundation material, the Contractor shall dig test pits and make test borings and foundation bearing tests. The Engineer will pay the cost according to Subsection 104.03 - Extra Work. \*

The Contractor shall notify the Engineer for inspecting and accepting the elevation and character of the foundation before placing concrete or masonry in the footing whenever the Contractor completes structure excavation to the foundation grade of a footing. \*

(E) **Structure and Trench Backfill.** The Contractor shall not deposit \*  
 material in fills until the test samples imply that the concrete has \*  
 developed a strength required in Subsection 503.03(E) - Loading against \*  
 the back of: \*

- (1) concrete abutments,
- (2) piers,
- (3) concrete retaining walls, or
- (4) the outside walls of concrete culverts

The Contractor shall cure the test samples under conditions similar \*  
 to those affecting the structure. The Contractor shall progress \*  
 backfilling so that excessive unbalanced loads are not introduced against \*  
 the structure. \*

The Contractor shall place backfill material in uniform horizontal \*  
 layers not exceeding eight (8) inches in loose thickness before \*  
 compaction. The Contractor shall moisten and compact each layer of \*  
 backfill until the Contractor obtains a relative compaction of not less \*  
 than ninety-five (95) percent. The Engineer may reduce compaction \*  
 requirement of ninety-five (95) percent in situations where such \*  
 compaction is not feasible such as in footings located in running streams \*  
 or in swampy areas. The Engineer will be the sole judge of the degree of \*  
 reduction. The Contractor shall backfill the footings with rockfill \*  
 instead of the ninety-five (95) percent compaction requirement in stream \*  
 beds subject to appreciable scour. \*

If the Engineer cannot use the field density test, the Contractor \*  
 shall moisten and compact each layer of backfill with vibratory or \*  
 suitable equipment on granular backfill material. The Contractor shall \*  
 test methods to decide maximum densities and relative compaction \*  
 according to Subsection 106.09 - Special Test Methods. \*

The Contractor shall not use water containing an excessive quantity \*  
 of salt or other deleterious substances for compaction of structure and \*  
 trench backfill for metal pipes. \*

The Engineer will not permit compaction of backfill material by \*  
 ponding or jetting. \*

If required, the Contractor shall make sufficient fill at culverts \*  
 and bridges ahead of other grading operations to permit public traffic to \*  
 cross. \*

The Contractor shall compact structure backfill placed at the \*  
 following to a relative compaction of not less than ninety (90) percent: |

- (1) Overside drains not beneath surfacing. \*

- (2) Footing for slope protection, slope paving, and aprons. |
- (3) Headwalls, endwalls, and culvert wingwalls. \*|
- (4) Retaining walls except portions under surfacing and crib wall. \*|
- (5) Inlets in median areas or in traffic interchange loops. |
- (6) Footings not beneath surfacing. \*|
- (7) Other locations where the plans show ninety (90) percent \*|  
relative compaction for structure backfill. \*|

(F) **Filter Material.** The Contractor shall place filter material for \*|  
backfill at bridge abutments, retaining walls and at perforated \*|  
underdrain pipes according to the contract or ordered by the Engineer. \*|

The Contractor shall make the subgrade as impervious as possible by \*|  
pneumatic tamping or other acceptable methods where the Contractor \*|  
places the material. The Contractor shall compact filter material \*|  
thoroughly in layers with the backfill. \*|

#### 206.04 Method of Measurement.

(A) **Structure Excavation.** The Engineer will measure structure \*|  
excavation by the cubic yard according to the following: \*|

The contract specifies the limits for structure excavation payment \*|  
or as ordered. The Engineer will not deduct pay quantities for bridge, \*|  
retaining wall, headwall for culverts, and other structure foundation \*|  
excavation where the Contractor does not choose to excavate material \*|  
that is outside the limits of the actual structure but within the limits \*|  
of excavation limits of excavation shown in the contract or as ordered \*|  
subject to the acceptance of the Engineer. The Engineer will not measure \*|  
beyond the limits of concrete neat pour lines. \*|

The lower limit for payment of structure excavation for foundations |  
for bridges, retaining walls, headwalls for culverts, and other |  
structures shall be the bottom of the completed foundations. |

The lower limit for payment of structure excavation for pipes |  
(except water and sewer pipes as specified in Sections 624 and 625) and |  
culverts shall be the grade line or elevation designated in the contract |  
or as ordered. |

If ordered by the Engineer to increase the depth of structure \*|  
excavation below the depth shown in the contract, the Engineer will \*|  
measure the material removed to a depth of not more than three (3) feet \*|  
below said depth at the contract price per cubic yard for structure \*|  
excavation. \*|

The Engineer will measure for the removal of material from depths greater than three (3) feet below said depth as extra work according to Subsection 104.03 - Extra Work. The Contractor has the option of measuring the material removed at the contract price per cubic yard for structure excavation before the Contractor makes the excavation.

The Engineer will not make compensation for the:

(1) removal and disposal of material that may come into an excavation from outside the designated limits.

(2) the removal and disposal of swell material resulting from the driving of piles in an excavation.

(3) furnishing and placing backfill material in an excavation that is below the designated grade.

The Engineer will not include such quantities in the quantities of structure excavation to be paid for.

The upper limit for payment of structure excavation shall be the original ground surface before the start of construction operations with the following exceptions:

(1) The upper limit shall be the planes of the bottom and side slopes of said areas excavated shown on the contract or ordered where doing structure excavation within the roadway excavation area or ditch and channel excavation area.

(2) The upper limit shall be the planes of the new embankment at the elevation shown in the contract or specified for construction ahead of doing the required structure excavation where the Contractor makes structure excavation in new embankments. The upper limit shall be the surface of the embankment at the time the Contractor makes the excavation. The upper limit shall not be above the planes of the new embankment shown on the contract.

(3) The upper limit shall be as specified under Section 603 - Culverts and Storm Drains for pipes and culverts except structural plate culverts.

(4) The upper limit for payment of structure excavation shall be the original ground surface before the start of construction operations for structural plate culverts.

The lateral limits for payment of structure excavation shall be the vertical surfaces one (1) foot outside the neat lines of the footings. The trench width shall be:

(1) eighteen (18) inches outside the lateral limits for pipes and culverts except structural plate culverts.

(2) thirty-six (36) inches outside the lateral limits for structural plate culverts. \*

(3) as shown in the County Standard Details for County Public Works projects. \*

(4) the trench widths of the various size pipes as specified under Section 624 - Water System and Section 625 - Sewer System for water and sewer pipes. \*

The lateral limits for payment of structure excavation for a battery of two or more culverts (culverts placed next to each other and intended to serve as a unit), except for structural plate culverts, shall be eighteen (18) inches outside the external limits of the two (2) outer pipes. The lateral limits for payment of structure excavation shall be thirty-six (36) inches outside the external limits of the two out pipes for structural plate culverts. \*

The Engineer will not apply these requirements where the spaces between the pipes permit the use of compacting equipment such as power rollers. The Contractor shall treat each pipe as a single culvert where using such equipment. \*

The Engineer will not measure structure excavation when contracted on a lump sum basis. \*

The Contractor shall remove soft, spongy, or unsuitable material from the width equal to the span or diameter of the culvert plus one (1) diameter outside the lateral limits of the culvert if the Contractor meets such material. \*

(B) Structure Backfill. The Engineer will measure the accepted quantities of structure backfill for bridge abutments, wingwalls, retaining walls and structural plate culverts by the cubic yard according to the following provisions: \*

(1) Bridge abutments, wingwalls and retaining walls. \*

(a) The lower limit shall be the top of the completed footings.

(b) The upper limit for payment shall be the finished grade or the bottom of the pavement structure when under the roadway area.

(c) The lateral limits shall be one (1) foot outside the neat line of the footings. The limits whichever is at a greater distance from the backface in a direction normal to the wall stems shall be the vertical plane:

1. one (1) foot outside the heel of the footing, or

2. five (5) feet from the backface measured at the top.

The Engineer will deduct the volume of filter material measured \*|  
within the limits of payment for structure backfill for bridge \*|  
abutments, wingwalls, and retaining walls from the pay quantities of \*|  
structure backfill. \*|

**(2) Structural plate culverts. \*|**

(a) The lower limit shall be the grade line or elevation \*|  
designated in the contract or ordered for the lower outside \*|  
surface of the culverts.

(b) The upper limit shall be one (1) foot above the top of the \*|  
culverts.

(c) The lateral limits shall be the vertical surface one (1) \*|  
foot outside the lateral limits of the culverts.

The Engineer will deduct the volume occupied by the structural \*|  
plate culvert within the limits of payment for structure backfill \*|  
for structural plate culvert from the pay quantities of structure \*|  
backfill. \*|

The lateral limits for payment for structure backfill for a \*|  
battery of two (2) or more culverts placed adjacent to each other \*|  
and intended to serve as a unit, shall be thirty-six (36) inches \*|  
outside of the external limits of the two (2) outer pipes. The \*|  
Engineer will not apply these requirements where the spaces between \*|  
the pipes permit the use of compacting equipment such as power \*|  
rollers. The Engineer will treat each pipe as a single culvert \*|  
where the Contractor uses such equipment. \*|

The Engineer will not measure structure backfill when \*|  
contracted on a lump sum basis. \*|

The lateral limits shall be the vertical surface one (1) \*|  
diameter outside the lateral limits of the culverts for areas of \*|  
soft, spongy or unsuitable material. |

**(C) Structure and Trench Backfill.** The Engineer will consider structure \*|  
and trench backfills not specified in the proposal or ordered incidental \*|  
to structure excavation. The Engineer will not measure for payment. \*|

**(D) Filter Material.** The Engineer will measure filter material by the \*|  
cubic yard. The Engineer will compute the quantities from the dimensions \*|  
shown in the contract or as ordered. \*|

The Engineer will not measure filter material when contracted on a \*|  
lump sum basis. \*|



The Engineer will consider structure excavation, structure backfill and filter material incidental to the various contract items when not specified in the proposal. The Engineer will not measure for payment.

### 206.05 Basis of Payment.

The Engineer will pay for the accepted quantities of structure excavation and structure backfill at the contract lump sum amount or at the contract price per cubic yards.

The price includes full compensation for furnishing labors, materials, tools, and equipment and doing the work involved in excavating, backfilling, disposing of the resulting excavated material, and obtaining a dry foundation bed, including the furnishing and installation or construction of cofferdams and other facilities necessary for the excavating and backfilling operations and their subsequent removal, if required.

The Engineer will pay for the accepted quantities of filter material at the contract lump sum amount or at the contract unit price per cubic yard, complete in place. The price shall be full compensation for furnishing, hauling, placing and compacting the filter material and for equipment, tools, labors and incidentals required to complete the work.

The Engineer will make payment under:

Pay Item	Pay Unit
Structure Excavation for Bridges	Cubic Yard
Structure Excavation for Bridges (____ C.Y.)	Lump Sum
Structure Excavation Other Than at Bridges	Cubic Yard
Structure Excavation Other Than at Bridges (____ C.Y.)	Lump Sum
Structure Excavation for _____	Cubic Yard
Structure Excavation for _____ (____ C.Y.)	Lump Sum
Structure Backfill for Bridge Abutments, Wingwalls, and Retaining Walls	Cubic Yard
Structure Backfill for Bridge Abutments, Wingwalls, and Retaining Walls (____ C.Y.)	Lump Sum
Structure Backfill for Structural Plate Culverts	Cubic Yard
Structure Backfill for Structural Plate Culverts	Lump Sum
Structure Backfill for _____	Cubic Yard

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Structure Backfill for _____ (____ C.Y.)	Lump Sum	
Filter Material	Cubic Yard	
Filter Material (C.Y.)	Lump Sum	

The Engineer will consider water furnished and applied for the compaction \*|  
of structure backfill included in the contract unit price of the pay item \*|  
involved. \*

The Engineer will consider full compensation for placing and compacting \*|  
surplus structure excavation in roadway embankments or disposing of the \*|  
material along the roadway as ordered included in the contract price for \*|  
excavating the material. If specified in the proposal, the Engineer will pay \*|  
for such overhaul ordered at the contract prices for such work. \*

When not specified in the proposal, the Engineer will consider structure \*|  
excavation, structure backfill and filter material incidental to the various \*|  
contract items. The Engineer will not pay separately. \*