SECTION 205 - EXCAVATION AND BACKFILL
FOR BRIDGE AND RETAINING STRUCTURES

205.01 Description. This section describes the following:

(A) Excavating and backfilling to depths and lines established for bridge,
head-mounted expressway sign, and retaining (reinforced concrete or
concrete rubble masonry) structure foundations.

(B) Other excavating and backfilling specifically designated in the contract
documents as structure excavations and backfills.

(C) Disposing of surplus material from structure excavations.

(D) Bailing, draining, sheathing, and constructing cofferdams, if necessary,
and subsequently removing sheathing and cofferdams.

205.02 Materials.

Filter Material 703.18
Structure Backfill Material 703.20
Cullet and Cullet-Made Materials 717

Structure backfill material shall include mixture of aggregate and cullet.
When cullet is not produced on the project island, or material unit price of cullet is
greater than material unit price of structure backfill, cullet may be excluded. Before
excluding cullet, submit availability and pricing documentation.

Controlled Low Strength Material (CLSM) in accordance with Section 314 –
Controlled Low Strength Material (CLSM) for Utilities and Structures may be used in
place of structure backfill material, subject to the Engineer’s acceptance. Where
CLSM is allowed, provide drainage system to accommodate underground water
seepage.

205.03 Construction.

(A) Structure Excavation.

(1) General. Notify the Engineer 10 working days before
excavating for structures.

The Contractor shall be responsible for the stability of
temporary open cuts during construction of structures or trenches and
shall take appropriate measures to meet OSHA requirements.
In structure excavation operations, do not disturb ground below elevations indicated in the contract documents. If ground below elevations indicated in the contract documents is disturbed, excavate disturbed ground until undisturbed ground is reached. Backfill this area with Class D concrete until required foundation elevation is reached.

Keep foundation excavation dry by draining, bailing, pumping, driving sheathings; or by constructing cofferdams and cribs.

When material from excavation does not meet quality requirements specified for backfill in accordance with Subsection 205.02 - Materials, furnish conforming material, as required.

Deposit remaining structure excavation material that is not used as structural backfill, in roadway embankments in accordance with Subsection 203.03(B)(1) – Selected Material. Dispose of surplus selected material in accordance with Subsection 203.03(B)(3) – Surplus Selected Material.

Cofferdams. Construct cofferdams for foundation construction to depths well below bottom of footings to ensure stability and to adequate heights to seal off all water. Brace well and make as watertight as necessary for proper performance of work that must be conducted inside cofferdam. Provide interior cofferdam dimensions so as to give sufficient clearance for driving piles, constructing forms, and when not placing seal, permitting pumping from outside the forms.

When clearance indicated in the contract documents between outside line of footings and piles, or interior walls or surfaces are insufficient to permit pile driving or form building, the Contractor may enlarge cofferdams to provide sufficient clearance. The Engineer will consider enlargement exceeding one foot outside footing dimensions indicated in the contract documents as being for the sole purpose of expediting work of the Contractor and of no value to the State. The Engineer will not include for payment, excavation and backfill that exceed described limits.

Correct or enlarge cofferdams that are tilted or moved out of position during the process of sinking. Conduct such work at no increase in contract price or contract time.

In tidal waters or in streams at a time of probable flood, vent cofferdam walls at low water elevation to ensure equal hydrostatic head both inside and outside of cofferdam during pouring and setting of seals.

Shoring in cofferdams that will induce stress, shock, or
vibration in the permanent structure will not be allowed.

When permitted, cross struts or bracing may extend through foundation concrete. Such struts or bracing below low water will be allowed to remain in place. Remove struts or bracing above low water. Fill volume with concrete of the same mix as that specified for surrounding concrete.

If requested by the Engineer, submit drawings and design calculations, signed by Hawaii Licensed Structural Engineer, showing proposed method of cofferdam construction and other details left open to the Contractor’s choice or not fully indicated in the contract documents for substructure work.

After completion of structure, remove cofferdams, including sheathing and bracing, to a depth of 1 foot below streambed. Remove cofferdams in a manner that will not disturb or damage finished concrete or masonry.

(3) Foundation Treatment. When footing concrete or masonry is to rest upon rock, fully uncover rock and remove rock surface to a depth sufficient to expose sound rock. Roughly level rock surface or cut to steps; and roughen rock surface.

Grout seams in rock under pressure. The Engineer will pay cost in accordance with Subsection 104.02 - Changes.

While excavating for non-pile foundations where footing concrete or masonry is to rest on an excavated surface other than rock, do not disturb excavation bottom. Remove foundation material to final grade immediately prior to placing concrete or masonry.

Complete driven pile foundation excavation to footing bottom before driving piles therein. Remove excess materials remaining in the excavation, after pile driving, to footing bottom elevation.

In pile foundations, excavating a sufficient distance below footing bottom will be allowed, as indicated in the contract documents, at no increase in contract price or contract time. When ground surface has risen above plan grade after pile driving, remove surplus material at no increase in contract price or contract time. When ground surface is below plan grade after pile driving, backfill and compact to plan grade with acceptable material, at no increase in contract price or contract time.

(4) Inspection. When the Engineer needs to determine character of foundation material, excavate test pits, drill test borings, and perform foundation bearing tests in accordance with Section 211 -
Exploratory Work at Structure Footing.

When structure excavation to foundation grade is completed, request that the Engineer inspect and accept foundation elevation and character before placing concrete or masonry and reinforcing steel in the footing.

(B) **Structure Backfill.** Place structure backfill material A behind bridge abutments, wingwalls, and retaining walls. Do not deposit fill material against back of concrete abutments, piers, concrete retaining walls, and foundations until test samples indicate that concrete has developed strength required in Subsection 503.03(E) - Loading.

Cure test samples under conditions similar to those affecting the structure. Continue backfilling so that excessive unbalanced loads are not introduced against the structure.

When spreading and compacting backfill, do not operate heavy equipment closer to abutment or retaining walls, than a distance equal to the height of backfill above top of footing. Compact area remaining, in layers not more than 4 inches in compacted thickness, with power-driven hand tampers suitable for material being compacted.

Place backfill material in uniform horizontal layers not exceeding 8 inches in loose thickness, before compaction. Moisten and compact each layer of backfill until relative compaction of not less than 95 percent is achieved in accordance with Subsection 203.03(C)(2) – Relative Compaction Test. The Engineer may reduce 95 percent compaction requirement in situations where such compaction is not feasible.

When the Engineer cannot use field density test, compact each layer of backfill with vibratory or other accepted equipment on granular backfill material.

Compaction of backfill material by ponding or jetting will not be allowed.

When required, place sufficient fill at bridges ahead of other grading operations to permit public traffic to cross.

Compact structure backfill in the following areas to a relative compaction of not less than 90 percent:

1. Footings for slope protection, slope paving, and aprons.
2. Retaining walls, except portions under surfacing, and crib walls.
Footings not beneath surfacing.

Other locations where the contract documents indicate 90 percent relative compaction for structure backfill.

(C) Filter Material. Place backfill filter material at bridge abutments and retaining walls in accordance with the contract documents.

Make subgrade as impervious as possible to direct drainage toward weep holes. Impervious material is defined as materials passing the No. 200 sieve and compacted to minimum 90 percent of maximum density, when tested in accordance with AASHTO T 180, Method D.

205.04 Measurement.

(A) Structure Excavation. Structure excavation will be paid on a lump sum basis. Measurement for payment will not apply.

(B) Structure Backfill. Structure backfill for bridge abutments, wingwalls, and retaining walls will be paid on a lump sum basis. Measurement for payment will not apply.

(C) Filter Material. Filter material will be paid on a lump sum basis. Measurement for payment will not apply.

205.05 Payment. The Engineer will pay for the accepted pay items listed below at the contract price per pay unit, as shown in the proposal schedule. Payment will be full compensation for the work prescribed in this section and the contract documents.

The Engineer will pay for each of the following pay items when included in the proposal schedule:

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Pay Unit</th>
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<tbody>
<tr>
<td>Structure Excavation for _____________</td>
<td>Lump Sum</td>
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<tr>
<td>Structure Backfill for _____________</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>Filter Material</td>
<td>Lump Sum</td>
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</table>

The Engineer will pay for removal of material from depths greater than 3 feet below depths indicated in the contract documents in accordance with Subsection 104.02 - Changes.