

**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, overhead-mounted expressway sign, and retaining (reinforced concrete or cement 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.

## 205.03

48 In structure excavation operations, do not disturb ground below  
49 elevations indicated in the contract documents. If ground below  
50 elevations indicated in the contract documents is disturbed, excavate  
51 disturbed ground until undisturbed ground is reached. Backfill this  
52 area with Class D concrete until required foundation elevation is  
53 reached.

54  
55 Keep foundation excavation dry by draining, bailing, pumping,  
56 driving sheathings; or by constructing cofferdams and cribs.

57  
58 When material from excavation does not meet quality  
59 requirements specified for backfill in accordance with Subsection  
60 205.02 - Materials, furnish conforming material, as required.

61  
62 Deposit remaining structure excavation material that is not  
63 used as structural backfill, in roadway embankments in accordance  
64 with Subsection 203.03(B)(1) – Selected Material. Dispose of surplus  
65 selected material in accordance with Subsection 203.03(B)(3) –  
66 Surplus Selected Material.

67  
68 **(2) Cofferdams.** Construct cofferdams for foundation construction  
69 to depths well below bottom of footings to ensure stability and to  
70 adequate heights to seal off all water. Brace well and make as  
71 watertight as necessary for proper performance of work that must be  
72 conducted inside cofferdam. Provide interior cofferdam dimensions  
73 so as to give sufficient clearance for driving piles, constructing forms,  
74 and when not placing seal, permitting pumping from outside the forms.

75  
76 When clearance indicated in the contract documents between  
77 outside line of footings and piles, or interior walls or surfaces are  
78 insufficient to permit pile driving or form building, the Contractor may  
79 enlarge cofferdams to provide sufficient clearance. The Engineer will  
80 consider enlargement exceeding one foot outside footing dimensions  
81 indicated in the contract documents as being for the sole purpose of  
82 expediting work of the Contractor and of no value to the State. The  
83 Engineer will not include for payment, excavation and backfill that  
84 exceed described limits.

85  
86 Correct or enlarge cofferdams that are tilted or moved out of  
87 position during the process of sinking. Conduct such work at no  
88 increase in contract price or contract time.

89  
90 In tidal waters or in streams at a time of probable flood, vent  
91 cofferdam walls at low water elevation to ensure equal hydrostatic  
92 head both inside and outside of cofferdam during pouring and setting  
93 of seals.

94  
95 Shoring in cofferdams that will induce stress, shock, or

96 vibration in the permanent structure will not be allowed.

97  
98 When permitted, cross struts or bracing may extend through  
99 foundation concrete. Such struts or bracing below low water will be  
100 allowed to remain in place. Remove struts or bracing above low  
101 water. Fill volume with concrete of the same mix as that specified for  
102 surrounding concrete.

103  
104 If requested by the Engineer, submit drawings and design  
105 calculations, signed by Hawaii Licensed Structural Engineer, showing  
106 proposed method of cofferdam construction and other details left open  
107 to the Contractor's choice or not fully indicated in the contract  
108 documents for substructure work.

109  
110 After completion of structure, remove cofferdams, including  
111 sheathing and bracing, to a depth of 1 foot below streambed.  
112 Remove cofferdams in a manner that will not disturb or damage  
113 finished concrete or masonry.

114  
115 **(3) Foundation Treatment.** When footing concrete or masonry is  
116 to rest upon rock, fully uncover rock and remove rock surface to a  
117 depth sufficient to expose sound rock. Roughly level rock surface or  
118 cut to steps; and roughen rock surface.

119  
120 Grout seams in rock under pressure. The Engineer will pay  
121 cost in accordance with Subsection 104.02 - Changes.

122  
123 While excavating for non-pile foundations where footing  
124 concrete or masonry is to rest on an excavated surface other than  
125 rock, do not disturb excavation bottom. Remove foundation material  
126 to final grade immediately prior to placing concrete or masonry.

127  
128 Complete driven pile foundation excavation to footing bottom  
129 before driving piles therein. Remove excess materials remaining in  
130 the excavation, after pile driving, to footing bottom elevation.

131  
132 In pile foundations, excavating a sufficient distance below  
133 footing bottom will be allowed, as indicated in the contract documents,  
134 at no increase in contract price or contract time. When ground  
135 surface has risen above plan grade after pile driving, remove surplus  
136 material at no increase in contract price or contract time. When  
137 ground surface is below plan grade after pile driving, backfill and  
138 compact to plan grade with acceptable material, at no increase in  
139 contract price or contract time.

140  
141 **(4) Inspection.** When the Engineer needs to determine character  
142 of foundation material, excavate test pits, drill test borings, and  
143 perform foundation bearing tests in accordance with Section 211 -

## 205.03

144 Exploratory Work at Structure Footing.

145

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

150

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

156

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

160

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

166

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

173

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

177

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

180

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

183

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

186

187 **(1)** Footings for slope protection, slope paving, and aprons.

188

189 **(2)** Retaining walls, except portions under surfacing, and crib walls.

190

190  
191  
192  
193  
194  
195  
196  
197  
198  
199  
200  
201  
202  
203  
204  
205  
206  
207  
208  
209  
210  
211  
212  
213  
214  
215  
216  
217  
218  
219  
220  
221  
222  
223  
224  
225  
226  
227  
228  
229  
230  
231  
232  
233  
234  
235  
236  
237

(3) Footings not beneath surfacing.

(4) 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:

<b>Pay Item</b>	<b>Pay Unit</b>
Structure Excavation for _____	Lump Sum
Structure Backfill for _____	Lump Sum
Filter Material	Lump Sum

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.