

If Class 4 Excavation is not specified in the Contract Documents, all excavation shall be Class 3 Excavation.

#### **402.02 MATERIALS.**

Crusher Run Aggregate CR-6	901.01
Subfoundation Concrete	902.10, Mix No. 1

**402.03 CONSTRUCTION.** All excavation contiguous to existing pavements and structures shall be sheeted, shored, braced, and supported in a substantial manner to prevent settlement, movement, or damage to the pavement or structure. Excavated material shall not be placed in any manner that may endanger any structure and shall be kept out of waterways.

**402.03.01 Backfill and Embankment Material.** All suitable material removed from the excavation shall be placed in backfill or stored for future use. Excavated material shall not be wasted without permission of the Engineer. Boulders, logs or other unforeseen unsuitable material encountered shall be removed from excavated material prior to placing as backfill. Unsuitable material shall be disposed of in an approved disposal area.

**402.03.02 Footing Elevations.** The elevation for the bottom of the footing specified in the Contract Documents shall be considered as approximate only, and the Engineer may, during the period of construction, direct changes in dimensions or elevations of footings to secure a satisfactory foundation.

**402.03.03 Footing Foundations.** Footings for structures shall be on suitable foundations, and no concrete shall be placed or foundation piles driven until the foundations are approved by the Engineer.

All rock or other hard foundation material shall be cleaned of loose material and cut to a firm surface, either level or stepped as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. When concrete will rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Final removal of the foundation material to grade shall not be made until just prior to concrete placement. When the Contract Documents include an item for Subfoundation Investigation (Section 419), the item shall be used to verify the character of the foundation if directed by the Engineer.

Faces of footings shall be placed plumb against either undisturbed material, rock, sheeting, shoring, or forms. Faces of footings in rock shall bear against a minimum 1 ft depth of rock. If the excavation will not

stand plumb, the Contractor shall furnish and install sheeting, shoring, or forms as required. When specified in the Contract Documents, sheeting used to construct spread footings shall be left in place and cut off in conformance with 410.03.10. When not specified, or when sheeting is used to construct pile supported foundations, the sheeting may be removed.

The design of sheeting and shoring shall be the responsibility of the Contractor. When the material retained by the sheeting and shoring is greater than 6 ft high, the detail, procedure, and computations shall be submitted the same as specified for falsework details in TC-4.01 and the Contract Documents. The experience specified in TC-4.01 will be waived.

Forms used for footings shall be removed and the void between the footing and the embankment shall be backfilled with subfoundation concrete or tamped fill utilizing crusher run aggregate CR-6. The material shall be compacted to a minimum of 92 percent of maximum density when tested in conformance with T 180, Method C. Subfoundation concrete shall be used for this backfill when footings are submerged. Footing form working drawings will be required for approval for footings thicker than 6 ft or below the water table or adjacent to railroad tracks.

Where foundation piles are used, the excavation of each pit shall be completed to the as planned bottom of footing elevation before the piles are driven. After the driving is completed, all loose and displaced material shall be removed, without damaging the placed piling, leaving a suitable bed to receive the footing concrete. For tremie seal, the displaced material may remain in place provided the minimum thickness of footing concrete, pile embedment and the required sealing of the foundation seal is maintained.

Where foundation piles are not used on piers, abutments, retaining walls, and wing walls and excavation to suitable bearing must be made below the as planned bottom of the foundation, the additional excavated spaces under these substructure units shall be backfilled with subfoundation concrete or the footing elevation shall be lowered, or the footing deepened as specified in the Contract Documents or as directed by the Engineer. Rock foundations that are to receive footing concrete shall have a rough finish. Where excavation to suitable bearing for box culverts must be made below the as planned bottom of the foundation, additional excavated spaces under the barrels shall be backfilled with selected backfill.

**402.03.04 Cofferdams and Foundation Seals.** When cofferdams are required, the Contractor shall submit for review, drawings and a complete

description of the process for construction of the cofferdam. Timber or bracing left in the cofferdams or cribs shall not extend into the substructure concrete. Cofferdams shall be constructed to protect the concrete against damage.

- (a) **Foundation Seal.** When the foundation cannot be dewatered, the Engineer may require the construction of a concrete foundation seal. The Contractor shall submit for review drawings and description of the process before placing the seal. If a mud wave is created during the placement of the tremie seal, the displaced material shall be removed in order to preserve the full foundation cross section specified in the Contract Documents. The foundation shall then be pumped out and the footing placed in the dry. When weighted cribs are employed and the crib's weight is utilized to overcome a part of 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, the cofferdam shall be vented or ported at low water level as directed.
- (b) **Pumping.** Pumping is prohibited during the placing of concrete. Pumping to dewater a sealed cofferdam shall not begin until the seal has set sufficiently to withstand the hydrostatic pressure.
- (c) **Removal of Cofferdams or Cribs.** Cofferdams or cribs shall be removed by the Contractor after the completion of, and without damage to the substructure.
- (d) **Stability of Foundation.** The Contractor shall stabilize the foundation area so that the concrete footing can be constructed in the dry and in its proper place.

**402.03.05 Backfilling.** All excavated spaces resulting from structure excavation not occupied by the portions of the permanent work shall be backfilled with suitable material. The backfilling shall be carried to the surface of the surrounding ground or grade as specified in the Contract Documents. Borrow shall not be used until the available project excavation is exhausted. The top surface of the backfilled areas shall be neatly graded. Backfill compaction shall conform to Sections 204 or 210.

**Backfilling Against Structures.** Backfilling against various structures shall be performed as follows:

- (a) **Brick Masonry.** Backfilling will not be permitted until seven days after completion of the section.

- (b) **Concrete Structures.** Backfilling will not be permitted until curing is completed and the concrete has achieved 80 percent of the specified compressive strength.
- (c) **Footings, Culverts and Piers.** Fill placed around footings, culverts and piers shall be deposited on both sides to approximately the same elevation at the same time.
- (d) **Abutments, Retaining Walls, Culverts or Other Structures.** The bed for the backfill shall be built up in horizontal layers so that at all times there is a horizontal berm of uniformly compacted material behind the structure for a distance at least equal to the height of the abutment or wall remaining to be backfilled, except where undisturbed material protrudes into this area. Compaction of the berm shall conform to 204.03. Jetting of fills or other hydraulic methods involving liquid or semiliquid pressure within the berm area is prohibited.

**402.04 MEASUREMENT AND PAYMENT.** Class 3 Excavation and Class 4 Excavation will be measured and paid for at the Contract unit price per cubic yard for the volume of material actually removed from within the limits specified.

No measurement or payment will be made for removing any water or liquids.

Class 3 Excavation and Class 4 Excavation will extend a maximum of 18 in. to vertical planes outside of the structure. Where blasting is required, a maximum of 6 in. will be allowed below the planned elevation.

Class 3 Excavation and Class 4 Excavation will include excavation for bridges, box culverts, and other structures as specified in the Contract Documents.

The upper limits for Class 3 Excavation on existing ground or embankments will be the existing groundline or the lower limit of roadway excavation. The lower limit of the two will control.

The upper limits for Class 3 Excavation on preliminary embankments will be the bottom of the as planned footing elevation. For stepped footings the upper limits will be the bottom of the as planned footing elevation of the highest portion of the footing. If the preliminary embankment has a surcharge, the upper limits will be the lower limit of roadway excavation.

The upper limits for Class 4 Excavation will be the bottom of the stream bed or the water elevation shown on the Contract Documents, whichever is lower.

The payment for Class 3 Excavation and Class 4 Excavation specified in the Contract Documents will be full compensation for all excavation, backfill, filling void around footings due to removing forms, blasting, grout, dewatering, removal and disposal of excess or unsuitable material, and for all material, labor, equipment, tools, and incidentals necessary to complete the work. When an item for Class 3 Excavation and Class 4 Excavation is not included in the Contract Documents, the excavation will not be measured but the cost will be incidental to other items.

Excavation for Pipe Culverts, Culvert End Walls, Inlets, and Manholes is excluded from the Class 3 Excavation or Class 4 Excavation.

**402.04.01** Additional excavation required below the elevation specified in the Contract Documents and necessitated by the lowering or deepening of footings, or the placing of subfoundations or underpinning, will be measured and paid for at the Contract unit price for either Class 3 Excavation or Class 4 Excavation as directed by the Engineer.

**402.04.02** Sheet piling, bracing, and shoring either removed or left in place, will not be measured but the cost will be incidental to other pertinent items unless otherwise specified in the Contract Documents.

**402.04.03** Excavation necessary to expose or remove piles, grillages, sheet piling, cribbing, masonry, or other obstructions will not be measured nor paid for if the excavation occurs outside the limits of excavation. The removal and disposal of obstructions within the limits of excavation will not be measured separately but the cost will be included in the Contract unit price for either Class 3 Excavation or Class 4 Excavation.

## SECTIONS 403 — 404 RESERVED

### SECTION 405 — REMOVAL OF EXISTING STRUCTURES

**405.01 DESCRIPTION.** This work shall consist of the removal and disposal, wholly or in part, of existing structures as specified in the Contract Documents.

**405.02 MATERIALS.** Not applicable.