

SECTION 207**STRUCTURE BACKFILL**

DESCRIPTION

207.01.01 GENERAL

- A. This work shall consist of placing and compacting, to the lines designated on the plans or as established by the Engineer, backfill material in excavations for bridges, retaining walls, headwalls for culverts, and other structures; placing and compacting backfill material for box culverts and other non-pipe culverts; and other backfill specifically designated in the contract documents as structure backfill. This item does not include backfilling pipes within a trench or minor miscellaneous structure excavations outside the limits of the roadway.

MATERIALS

207.02.01 SELECTED BACKFILL

- A. Selected backfill shall be of a quality acceptable to the Engineer and shall consist of suitable material from the excavation complying to Table 1. It shall be free from sod, frozen earth, organic materials, rubbish, or debris. If the material does not comply with Table 1, it may be used only if approved by the Engineer.

Table 1 – Select Backfill Gradation

Sieve Sizes	Percentage of Weight Passing
6-inch	100
3-inch	80-100
No. 4	35-100

Table 2 – Select Backfill Maximum Plastic Index Requirement

Percentage by Weight Passing No. 200 Sieve	Plasticity Index Maximum
10-10.0	15
10.1-20.0	12
20.1-50.0	10
50.1-80.0	8
80.1-100.0	6

- B. When the completed select backfill test results from the sample indicate a Plasticity Index of 12 or greater, a swell potential test may be required. Contact the Contracting Agency for further procedure requirements or comply with the contract Special Provisions.
- C. The liquid limit of the material shall not exceed 50 percent maximum.
- D. Stones or lumps exceeding 3 inches shall not be used within the zones 12 inches or less from the structure, 12 inches or less from the finish subgrade in unpaved areas, or 16 inches or less below the finish subgrade in paved areas.
- E. Acceptable material from excavation "Selected Backfill" may be used for structure backfilling unless "Granular Backfill" is specified.

207.02.02 GRANULAR BACKFILL

- A. Granular backfill shall consist of natural sand or a mixture of sand with gravel. Broken Portland cement concrete and bituminous type pavement will be permitted, subject to the gradation limits specified herein. The granular backfill material shall have a sufficient amount of fine material to fill the voids between the coarser aggregate.
- B. In addition, the material shall conform to the following requirements:

Table 3 – Granular Gradation

Sieve Sizes	Percentage of Weight Passing
3-inch	100
No. 4	35-100
No. 16	25-100
No. 200	5-15

- C. The plasticity index of the material shall be as specified in **Subsection [704.03.01](#), "Plastic Limits."**
- D. The total available water soluble sulfate content of the material shall not exceed 0.3 percent by dry soil weight.

CONSTRUCTION**207.03.01 GENERAL**

- A. Compaction of backfill or embankment around all structures shall be in accordance with the requirements of AASHTO LFRD Bridge Construction Specifications with exceptions as described in this section. The compaction shall be performed with mechanical tamping units and the material shall be placed in layers of thickness compatible with the characteristics of the backfill and the type of equipment being used subject to approval by the Engineer.
- B. Unless otherwise specified or approved by the Engineer, the compaction requirement shall be a minimum of 90 percent.
- C. Mechanically compacted backfill shall be placed in layers of thickness compatible with the characteristics of the backfill and the type of equipment being used. Backfill material shall be placed in uniform horizontal layers with a maximum compaction depth of 12 inches and a maximum loose lift of 16 inches and shall be brought up uniformly on all sides of the structure or improvement.
- D. Backfill material to be used around buried structures where water is present or anticipated to be present shall be carefully selected so that it will protect the surrounding soil from infiltrating into the backfill as determined by the Engineer. This select material shall serve as a filter material. If the drain material is to remove an appreciable quantity of water, graded filter drains using separate fine-grained layers for filters and coarse-grained layers to conduct the water may be required. As an alternate to using a filter material, a filter fabric may be placed between the backfill material and surrounding soil.
- E. Material resulting from structure excavation and not used, shall be deposited in roadway embankments in accordance with the requirements specified elsewhere or otherwise disposed of in a manner approved by the Engineer and no additional compensation will be allowed for such work.

- F. Structure backfill shall not be placed until the structure or facilities have been inspected by the Engineer and approved for backfilling. Backfill material shall not be deposited against the back of concrete abutments, concrete retaining walls, or the outside walls of concrete box culverts until the concrete has reached 80 percent of the required compressive strength and approved by the Engineer.
- G. Backfill operations placed against concrete walls that will support any deck shall not be performed until after the deck has been placed.
- H. Where backfill is placed against waterproofed surfaces, care shall be taken that no damage is done to the waterproofing material.

207.03.02 PLACING AND COMPACTING AT ABUTMENTS, PIERS, WINGWALLS AND RETAINING WALLS

- A. With the approval of the Engineer, all spaces excavated and not occupied by abutments, piers, or other permanent work shall be refilled with earth up to the surface of the surrounding ground or to the limits designated on the plans or as described herein. All backfill shall be thoroughly compacted in accordance with the provisions set forth in **Subsection [207.03.01](#), "General."**
- B. Where backfill is to be placed on one side of an abutment, wingwall, pier, or headwall, care shall be exercised to prevent displacement of line, or batter, or both.
- C. Existing slopes that are shaped to cause wedge action in the backfill shall be step-cut or benched before backfilling.

207.03.03 PLACING AND COMPACTING AT CULVERTS

- A. After the bedding has been prepared and the culverts installed or constructed as required by the pertinent specifications, "Selected Backfill" or "Granular Backfill" shall be placed along both sides of the culvert equally in uniform layers such that the elevation of the top of the backfill on either side of the culvert does not exceed the elevation of the top of the backfill on the other side of the culvert by more than 6 inches. The thickness of each layer shall be compatible with the characteristics of the backfill and the type of equipment being used, but shall not exceed 12 inches in depth after compaction nor a loose lift of 16 inches. Each layer shall be wetted as required and thoroughly compacted to the density requirements as set forth in **Subsection [207.03.01](#), "General."**
- B. Special care shall be taken in placing and thoroughly compacting the material under the haunches of all pipe culverts.
- C. Unless otherwise directed, the backfilling shall continue as directed to the level of the ground or to an elevation 6 inches above the structure in the case of a pipe culvert in projection, or even with the top of the structure in the case of reinforced concrete box culvert in projection.
- D. No construction equipment or other traffic shall be permitted to cross any culvert until a safe minimum depth of fill above the culvert has been placed and compacted in accordance with these specifications. The Contractor shall be solely responsible for protecting the structure from superimposed loading by construction equipment and shall repair any damage to the structure or replace the structure as ordered without extra compensation.
- E. Special care shall be taken in backfilling arches, particularly half-circle arches. The arch shall be covered in layers, each layer conforming to the shape of the arch and tamped thoroughly.

207.03.04 PLACING AND COMPACTING OF BIN-TYPE RETAINING WALLS

- A. Placing and compacting backfill material for bin-type retaining walls shall progress concurrently with the assembly of the bins, and backfilling around the outer sides thereof shall be kept approximately level with the inside fills. The materials shall be thoroughly tamped and meet the density requirements as set forth in **Subsection 207.03.01, "General."** Care shall be exercised to completely fill the depressions of stringers and spacers without displacing them from established line and batter.

METHOD OF MEASUREMENT

207.04.01 BLANK

BASIS OF PAYMENT

207.05.01 PAYMENT

- A. Unless otherwise provided in the Special Provisions or Proposal, no payment will be made for structure excavation or backfill as such; the cost thereof under normal circumstances being considered as included in the price bid for the construction or installation of the items to which such excavation or backfill is incidental or appurtenant. Payment for such excavation or backfill will be made when the Special Provisions or Proposal provides.

TESTING

207.06.01 TESTING

Table 4 - Testing

Spec. Section	Description	Test	Reference Specification and/or Test Procedure	Recommended Frequency ¹
207.02.01	Selected Backfill	Sieve Analysis	AASHTO T11 & T27 USS 301 & Special Provisions	1/1000 CY
		Plasticity Index	AASHTO T89 & T90 USS 301 & Special Provisions	1/1000 CY
207.02.02	Granular Backfill	Sieve Analysis	AASHTO T11 & T27 USS 301 & Special Provisions	1/1000 CY
		Soluble Sulfates	AWWA 4500E	1/Type
207.03.01	General	Field Density	AASHTO T310	If Riding Equipment Used: 1/5000 SF/Lift
				If Walk Behind Equipment Used: 1/1000 SF/Lift Per Structure Per Day

¹ A maximum testable lift is defined as a 12-inch layer of compacted material.