218.7
218.7-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
218001-*	RIPRAP	CUBIC YARD (METER)
218002-*	GROUTED RIPRAP	CUBIC YARD (METER)
218003-*	GABION	CUBIC YARD (METER)
218004-*	"thickness" CRUSHED ROCK SLOPE PROTECTION	SQUARE YARD (METER)
218005-*	CONCRETE SLOPE PROTECTION	SQUARE YARD (METER)
218006-*	FOUNDATION PROTECTION	CUBIC YARD (METER)
218007-*	FABRIC FOR EROSION CONTROL	SQUARE YARD (METER)
218008-*	SHOT ROCK	TON (MEGAGRAM)

*Sequence number

SECTION 219
CONTROLLED LOW-STRENGTH MATERIAL

219.1-DESCRIPTION:

A Controlled Low Strength Material (CLSM) is a non-compacted, cementitious material used primarily as a backfill in lieu of a compacted material.

This work shall consist of furnishing and placing CLSM as a backfill material in accordance with these Specifications and in reasonably close conformity with the lines, grades, thicknesses and cross sections shown on the Plans or established by the Engineer.

219.2-MATERIALS:

Materials shall meet the requirements specified in the following Subsections of section 700.

Material	**Subsection**
Flyash:	707.4.1 (except with a maximum loss on ignition of 12%)
Portland Cement:	701.1 or 701.3
Aggregate:	
1. Bottom Ash:	703.3.3 (except with the following gradation and a maximum loss on ignition of 12%):

Sieve Size	**Percent Passing by Weight:**
¾ inch (19 mm)	95%
3/8 inch (9.5 mm)	85-100%
#100 (150 µm)	0 – 25%

2. Fine Aggregate: 702.1.1 – 702.1.5 with the following gradation:

Sieve Size	Percent Passing by Weight:
3/8 inch (9.5 mm)	100%
#200 (150 µm)	0-10%

Water: 715.7

Admixtures: 707

219.3-PROPERTIES:

Type	28 Day Compressive Strength
A	50 psi min./150 psi max. (345 kPa min./1035 kPa max.)
B	50 psi min. (345 kPa)
C	1000 psi min. (6900 kPa)

pH 5.0 – 13.0

Flow - A minimum spread of 6 inches (150 mm) determined from a representative sample placed, without tamping, in an open ended 3 inches (75 mm) diameter by 6 inch (150 mm) high cylinder placed on a flat non-absorbent surface and slowly removed.

219.4-CONSTRUCTION METHODS:

219.4.1-Proportioning: Prior to the start of construction, the Contractor shall design and submit to the Engineer for approval the proportions of materials, including admixtures, to be used which will result in a workable, CLSM mixture having the desired properties.

A mix design shall be required for each type of CLSM to be used in the work. The mix design shall be accompanied by a statement giving the source of materials and certified test data demonstrating the adequacy of the mix design.

The results of the mix design testing shall include a listing of the components used in the mix, the results of unconfined compressive strength tests, pH, and flow.

The mix shall have a consistency that will allow the material to fill all voids during placement without vibration or other consolidation methods.

219.4.2 – Testing: For every 100 cubic yards (75 cubic meters) or less of material placed, prepare cylindrical samples for unconfined compression testing

according to AASHTO T-22 and determine the flow. Field cure the samples in accordance with AASHTO T-23. Test the three cylinders at 28-day cure. The average compressive strength at 28 days shall meet the specification requirements. Material not meeting the minimum compressive strength at 28 days shall be removed at the Contractor's expense. Type A material that exceeds the maximum compressive strength shall be evaluated by the Division.

Report all test results, in written form, to the Engineer within 24 hours after completion of each test.

Contractor's Quality Control: Quality control of the CLSM is the responsibility of the Contractor. The Contractor shall maintain equipment and certified Portland cement concrete inspector(s) who shall maintain equipment and direct all field inspection, sampling and testing necessary to determine the magnitude of the various properties of the CLSM governed by the Specifications and shall maintain these properties within the limits of this Specification. A Quality Control Plan prepared according to MP 601.03.50 shall be submitted to the Engineer at the pre-construction conference.

Acceptance Testing: Acceptance sampling and testing of CLSM is the responsibility of the Division.

Quality control sampling and testing performed by the Contractor may be used by the Division for acceptance.

219.4.3 – Equipment and Tools: Equipment shall be according to 601.5.

219.4.4 – Site Preparation: The Contractor shall provide the necessary barriers to confine the CLSM. Pipe culverts and any other items to be backfilled that could move or float during backfilling, shall be secured by the Contractor to prevent movement.

219.4.5 – Mixing: The mixing shall be in accordance with 601.7 except that CLSM shall be delivered in a truck mixer. Mixing and delivery is also permitted using volumetric batching and mixing equipment in accordance with AASHTO M241. Volumetric mixers shall be properly calibrated and shall sufficiently mix the materials to produce a uniform product. The limitation on the total number of drum revolutions is waived. Sufficient drum revolutions shall be used just prior to discharge to insure a homogeneous slurry.

219.4.6 – Placement: The drop height for the CLSM shall be limited to the minimum necessary by using chutes or other devices.

CLSM shall be brought up evenly by moving the discharge points or by spreading the backfill manually. For backfilling around pipes, the backfill shall be placed evenly on both sides of the trench to avoid overstressing the pipe.

The lift thickness shall be limited to that shown on the plans or as directed by the Engineer to avoid overstressing the pipe, forms, structures or to avoid floating the pipe. Prior to placement of successive lifts, the CLSM shall be allowed to cure until it is self-supporting.

CLSM shall not be finished between lifts. The top of a lift shall be cleaned,

if necessary, to insure bonding with the next lift.

219.5-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
219001-*	CONTROLLED LOW STRENGTH MATERIAL, TYPE "type"	CUBIC YARD (METER)

* Sequence number

220 THROUGH 227-BLANK

SECTION 228
SUBGRADE PREPARATION

228.1-DESCRIPTION:

This work shall consist of preparing the subgrade for the placing of base or subbase in accordance with these Specifications and in reasonably close conformity with the lines, grades, dimensions and cross section shown on the Plans.

This item is intended to be used for any project or portion thereof where the Contract is for paving without grading.

228.2-MATERIALS:

Not specified.

228.3-CONSTRUCTION METHODS:

All work shall be performed in accordance with the applicable provisions of 207 and 211.

Subgrade preparation shall include the entire width of the subgrade. Excavation material shall be used to bring eroded areas to the plan cross section. If sufficient material is not obtained from the subgrade preparation, additional suitable material shall be obtained by the Contractor.

228.4-METHOD OF MEASUREMENT:

The quantity of work done will be measured in square yards (meters) of "Subgrade Preparation" as determined from lines and dimensions shown on the Plans.

When borrow is necessary to complete the subgrade preparation item, it will be measured and paid for under the provisions of 211.

228.5-BASIS OF PAYMENT:

The quantity, determined as provided above, will be paid for at the contract unit price for the item listed below, which price and payment shall be full compensation for doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, and incidentals necessary to complete the work.