

**2519 CELLULAR CONCRETE GROUT – CONTROLLED LOW STRENGTH MATERIAL (CLSM)**

**2519.1 DESCRIPTION**

This work consists of pressure grouting the area and voids between the existing pipe culvert and the inserted liner pipe.

**2519.2 MATERIALS**

**A Cement .....3101**

**B Fly Ash .....3115**

**C Fine Aggregate .....3126**

**D (Blank)**

**E Water.....3906**

**F Admixtures .....3113**

**2519.3 CONSTRUCTION REQUIREMENTS**

**A Mix Design**

Submit a mix design on the MnDOT Concrete Mix Design Submittal Sheet to the Engineer for review and approval, in conjunction with the Concrete Engineer, at least 15 days before placing the grout. Design the CLSM in accordance with Table 2519-1 or Table 2519-2 and meeting the requirements of ASTM C 403.

**A.1 CLSM Low Density**

Use the CLSM low density design when no water is present and no water intrudes during the setting process based on the following proportions per unit batch:

<b>Table 2519-1 CLSM Low Density Design</b>	
<b>Materials</b>	<b>Proportions per unit batch and mix parameters</b>
Portland cement	≥100 lb
Total cementitious (portland cement and Class C fly ash)	≥500 lb
Water/cementitious ratio	0.50
Pre-formed foam*	20 cu. ft
Grout (cast density)	30 lb ±3 lb per cu. ft
Slump	10 in ± 1 in
28-day compressive strength	75 psi – 400 psi
* Provide foaming agent meeting the requirements of ASTM C 869 when tested in accordance with ASTM C 796. The Contractor may use other admixtures, if approved by the mix designer and the Engineer, in conjunction with the Concrete Engineer. Provide cementitious material from the Approved/Qualified Products List. The Engineer, in conjunction with the Concrete Engineer, will review the concrete mix design submittal and approve if the concrete mix design meets contract requirements. The Engineer will base final approval for payment on satisfactory field placement and performance.	

**A.2 CLSM High Density**

Use the CLSM high density design when it is not possible to dewater, keep water out of the annular space during grouting, or both, based on the following proportions per unit batch:

## 2519.3

<b>Table 2519-2 CLSM High Density Design</b>	
<b>Materials</b>	<b>Proportions per unit batch and mix parameters</b>
Portland cement	≥150 lb
Total cementitious (portland cement and Class C fly ash)	≥500 lb
Fine aggregate	1,100 lb
Water/cementitious ratio	0.50
Pre-formed foam*	13.5 cu. ft
Grout (cast density)	70 lb ±3 lb per cu. ft
Slump	10 in ±1 in
28-day compressive strength	75 psi – 400 psi
<p>* Provide foaming agent meeting the requirements of ASTM C 869 when tested in accordance with ASTM C 796. The Contractor may use other admixtures, if approved by the mix designer and the Engineer, in conjunction with the Concrete Engineer. Provide cementitious material from the Approved/Qualified Products List. The Engineer, in conjunction with the Concrete Engineer, will review the concrete mix design submittal and approve if the concrete mix design meets contract requirements. The Engineer will base final approval for payment on satisfactory field placement and performance.</p>	

### **B Grouting Procedure**

Selected grouting pressures external to the liner pipe may collapse the liner pipe. Design a grouting procedure to fill voids between the existing culvert and the liner pipe, but will not collapse the liner pipe. Provide a pressure gauge to measure the grouting pressure and a method to measure the volume of injected grout. Submit a grouting plan to the Engineer for approval.

### **C Placement**

Use grout to fill voids between the existing culvert and pipe liner, including breaks or holes in the existing culvert.

Secure the pipe liner to the invert of the existing culvert by fasteners or blocks, or construct multiple grout lifts to prevent the pipe liner from floating during the grouting operations.

After grouting the liner to the in place culvert, encapsulate the remaining length of liner with Mix No. 3G52 concrete at least 6 in thick.

Finish the inlet end with a 45° mitered fillet-transition between the in place culvert and the inside of the liner.

Use cylindrical wooden plugs, or other equivalent material approved by the Engineer, to plug grout holes. After the grout has set, remove the plugs and fill with concrete.

### **2519.4 METHOD OF MEASUREMENT**

The Engineer will measure by the volume of grout injected into the void between the existing pipe culvert and the liner pipe. The Engineer will deduct accountable waste from the quantities measured for payment.

### **2519.5 BASIS OF PAYMENT**

The contract cubic yard price for CLSM includes the cost of dewatering, cement for securing the pipe liner to the existing culvert, and inlet bevel construction.

The Department will pay for CLSM on the basis of the following schedule:

<b>Item No.:</b>	<b>Item:</b>	<b>Unit:</b>
2519.507	CLSM Low Density	cubic yard
2519.507	CLSM High Density	cubic yard

## **2520 LEAN MIX BACKFILL**

### **2520.1 DESCRIPTION**

This work consists of placing a lean cementitious, controlled-density backfill into utility and culvert trenches, or other excavations, where the use of conventional compacting equipment is impractical.