S-216 (2519) CELLULAR CONCRETE – CONTROLLED LOW STRENGTH MATERIAL

REVISED 10/23/07

SP2005-189.2

The provisions of Mn/DOT 2519 are as follows:

SPECIAL PROVISIONS - SP2005BOOK Page 322

JUNE 30, 2006

Last Revision 7/9/10

2519.1 DESCRIPTION

This work shall consist of pressure grouting the area/voids between the existing pipe culvert and the inserted liner pipe and the following:

All voids between the existing culvert and the liner pipe, including all breaks or holes in the existing culvert shall be filled with grout.

2519.2 MATERIALS

A Cement 3101

B Fly Ash 3115

C Fine Aggregate 3126

D Blank

E Water 3906

F Admixtures 3113

2519.3 MIX REQUIREMENTS

A Mix Design

A minimum of 15 days prior to the commencement of grout placement, the Contractor shall submit a grout mix design on the Mn/DOT Concrete Mix Design Submittal Sheet to the Concrete Engineer for review and approval.

The foaming agent shall comply with ASTM C-869 when tested in accordance with ASTM C-796.

Other admixtures may be used when specifically approved by the mix designer and Mn/DOT's Concrete Engineer. All cementitious shall be supplied from Mn/DOT certified sources. Final approval of the mix design is based on satisfactory field placement.

The mix design shall include the following test information:

1. 28 day compressive strength
2. initial and final set times – ASTM C-403
3. flow diameter

The Contractor shall design the grout material as follows:

A1 Low Density

This design shall be used **when no water is present and no water intrudes during the setting process** based on the following proportions per unit batch (volume approximately 1 m^3 (**cubic yard**):

Portland Cement (minimum) 45 kg (**100 pounds**)

Total Cementitious (portland cement + Class C fly ash) (minimum)
300 kg (**500 pounds**)

Water/Cementitious Ratio 0.50

Pre-Formed Foam (Approximately) 0.60 m^3 (**20.0 cubic feet**)

Grout (Cast Density) 480 ±48 kg/m^3 (**30 ± 3 pounds per cubic foot**)

Slump 250 mm ± 25 mm (**10" ± 1"**)

28-day compressive strength 0.5 mPa - 2.8 mPa (**75 - 400 psi**)

A2 High Density

This design shall be used **when it is not possible to dewater and/or keep water out of the annular space during grouting** based on the following proportions per unit batch (volume approximately 1 m^3 (**cubic yard**)):

SPECIAL PROVISIONS - SP2005BOOK Page 323

JUNE 30, 2006

Last Revision 7/9/10

Portland Cement (minimum) 90 kg (**150 pounds**)

Total Cementitious (portland cement + Class C fly

ash) (minimum)
300 kg (**500 pounds**)
Fine Aggregate 650 kg (**1100 pounds**)
Water/Cementitious Ratio 0.50
Pre-Formed Foam (Approximately) 0.50 m^3 (**13.5 cubic feet**)
Grout (Cast Density) 1120 ±48 kg/m^3 (**70 ± 3 pounds per cubic foot)**
Slump 250 mm ± 25 mm (**10" ± 1"**)
28-day compressive strength 0.5 mPa - 2.8 mPa (**75 - 400 psi**)

B Grouting Procedure

Bidders are advised that selected grouting pressures external to the liner pipe may collapse the same. It is in this regard that the Contractor shall design a grouting procedure which will cause all voids between the existing culvert and the liner pipe to be filled, but will not collapse the liner pipe. The Contractor shall provide a pressure gauge that will measure the grouting pressure and a means to accurately measure the volume of grout injected. A grouting plan shall be submitted to the Engineer for approval.

C Placement

All voids between the existing culvert and pipe liner, including all breaks or holes in the existing culvert shall be filled with grout.

Pipe liners shall be secured to the invert of the existing culvert by means of fasteners, blocks, or other means to prevent the pipe liner from floating during the grouting operations. Another possible means of accomplishing the foregoing is by constructing multiple grout lifts.

After the liner has been grouted (connected) to the inplace culvert the remaining length of liner shall be encapsulated with a 150 mm [**6 inch**] minimum thickness of concrete Mix No. 3Y43 and the extreme ends of the annular space sealed with an approved seal.

The inlet end shall be finished with a 45 degree mitered fillet-transition between the inplace culvert and the inside of the liner.

If grout holes are utilized, cylindrical wooden plugs or other approved plugs shall be used to effectively plug holes until the grout has set and then removed and filled with concrete.

2519.4 METHOD OF MEASUREMENT

Measurement will be made by the volume of grout injected into the void between the existing pipe culvert and the liner pipe. **The quantities so determined will be reduced for payment by all accountable waste.**

2519.5 BASIS OF PAYMENT

Payment for Low strength CLSM specified at the Contract price per unit of measure of volume shall be compensation in full for all costs relative thereto, including dewatering, cement for securing the pipe liner to the existing culvert, and inlet bevel construction.

Payment for Low strength CLSM will be made on the basis of the following schedule:

Item No. Item Unit

2519.607 CLSM Low Density ..... cubic meter **(cubic yard)**
2519.607 CLSM High Density ..... cubic meter **(cubic yard)**