Office of Materials Management
NEW PRODUCT TEST
Testing of Proposed New Concrete Product for Noise Barriers

September 17, 2002

At the request of the Office of Environmental Services and the Office of Structural Engineering freeze-thaw testing was performed on a proposed lightweight concrete noise barrier panel.

Background

The Department's specifications for normal weight concrete for noise barriers requires freeze- thaw testing (ASTM C666) of at least 300 cycles. The concrete is considered accepted if the relative dynamic modulus of elasticity is above 80 after 300 freeze thaw cycles. The concrete samples are also evaluated for loss of material.

The samples sent by the Offices of Structural Engineering and Environmental Services were of a lightweight concrete product that were manufactured in an autoclave. According to information from the manufacturer, a special coating is required in order for the material to survive multiple freeze thaw cycles. The concrete samples arrived with the applied coating.

Procedure

The samples were tested to conform to ASTM C 666. As the specimens were of the size required for the freeze thaw equipment no sample preparation was required. The freeze thaw equipment used by the Office of Materials Management was the same equipment used for freeze thaw testing preformed on pavement aggregates.

Results

The test was performed according to ASTM C 666, Procedure B. Testing was terminated after 70 cycles. The autoclaved product of 3 x 4 x 15 inch samples were deteriorating. The coating was coming off and/or debonding over the whole specimen.

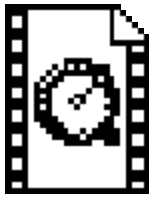
The pictures on the following page show the deterioration and condition of the specimens after 70 cycles.

CLOSE UP VIEW OF THE SPECIMENS @ 70 CYCLES

VIEW OF THE SPECIMENS @ 70 CYCLES

PORTIONS OF THE COATING THAT CAME OFF DURING THE TEST

THE COATING, AS REMOVED FROM THE FREEZE-THAW MACHINE



Mvc-005v.mpg

MOVIE CLIP SHOWING
DETERIORATION OF THE SPECIMEN
"Turn to Dust"

The specimens will be kept for three months for anyone who wants a closer examination of the bars.

		SPECIMEN A				SPECIMEN B			
		WEIGHT		FREQUENCY		WEIGHT		FREQUENCY	
DATE	CYCLE				D.F.				D.F.
9/9/02	INITIAL	2434.2		2.263	100	2370.3		2.197	100
9/10/02	1	2462.2	+1.2%	2.329	94.4	2400.0	+1.3%	2.277	93.1
9/12/02	22	2568.0	+5.5%	2.440	86.0	2488.6	+5.0%	2.380	85.2
9/16/02	70	2917.8	+19.9%	3.58*	40.0	2856.7	+20.5%	3.20*	47.1

*** The frequencies determination at 70 cycles are estimates. Readings were inconsistent.**
D.F. = Durability Factor

Conclusions

The concrete was an autoclaved product that required a special sealer to protect the product from the effects of freezing. The visual damage to the coating and the loss of material from the concrete, appears to support the claim that the product, uncoated, will not survive.

The other conclusion that must be made is the product, even with the coating, won't survive as the coating couldn't even make 300 cycles without failure.

Concrete products should be able to survive freeze-thaw testing with no coating. While coatings are applied for both color and additional durability, no concrete product currently being used by the Department exhibits the deterioration conditions this product has seen in the laboratory. The Office of Materials Management does not recommend this product for acceptance.