

YIELD TEST - ACCURACY OF METHODS

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VERMONT DEPARTMENT OF HIGHWAYS

John T. Gray, Commissioner

R. H. Arnold, Chief Engineer

A. W. Lane, Materials Engineer

Report Prepared By

Structural Concrete Sub Division

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INTRODUCTION

The relative yield is the ratio of actual volume of concrete obtained to the volume as designed for the batch. The relative yield of concrete is always of great interest to contractors, ready-mix suppliers and inspectors. Many factors affect this yield including specific gravity of aggregate, slump and air, cement content, and accuracy of the yield test itself. Specifications (AASHO - T121 and ASTM - C138) require that this test be performed using a 1/2 cubic foot measure. It has become common practice to use a 1/4 cubic foot measure for this purpose since this is the size normally used for air entrainment tests. This study was undertaken to determine if the results obtained with the 1/4 cubic foot measure are compatible with those of the 1/2 cubic foot measure.

MATERIALS

Eight ready-mix plants supplied both Class AA and Class B concrete for these tests. Five of the plants used a crushed rock coarse aggregate and the other three used a crushed gravel aggregate. Two companies supplied the cement.

PROCEDURE

The test procedures followed those outlined in AASHO T-121. Both measures (1/4 cubic foot and 1/2 cubic foot) were filled simultaneously, and the relative yields were computed on a form (Figure 1) prepared for use in the field. All of the tests were conducted on field projects located throughout the State.

The air content was determined by use of a pressure meter as well as Chace Air Indicator.

Table I shows all of the results in this test.

CONCLUSION

The average difference in the yield using the 1/2 cubic foot measure as the reference is as follows:

Class B = Δ + 0.2%
Class AA = Δ + 0.07%

These results show that the 1/4 cubic foot measure is accurate to the tolerance required and may be used in lieu of the 1/2 cubic foot measure.

YIELD TEST RESULTS

CLASS B CONCRETE

CONCRETE PLANT	½ CU. FT. BUCKET YIELD	½ CU. FT. BUCKET YIELD	DIFFERENCE WITH ½ CU. FT. AS STD.	AIR CONTENT PRES. METER/CHASE	CONCRETE SLUMP
ANDERSON SWANTON	100.7%	101.1%	-0.4%	6½	4"
CALKINS COVENTRY	100.3%	99.0%	+1.3%	5½	5½
	99.3%	99.6%	-0.3%	5 3/4	6
	99.5%	99.0%	+0.5%	5	6½
	100.3%	100.0%	+0.3%	5½	6
CARRARA CASTLETON	101.1%	101.1%	---	6 4/5	7
	101.2%	100.7%	+0.5%	6	6
CARRARA E. MIDDLEBURY	99.2%	98.8%	+0.4%	4 3/10	5
	101.1%	100.5%	+0.6%	5½	5½
KELLEY MONTPELIER	99.0%	99.0%	---	5 2/5	5½
MILLER BRADFORD	99.6%	100.3%	-0.7%	5 3/4	6½

CLASS AA CONCRETE

CALKINS COVENTRY	100.3%	100.0%	+0.3%	6½	7	2½"
	101.1%	101.5%	-0.4%	7	6½	--
	98.2%	97.8%	+0.4%	6	7½	2½"
	100.8%	100.0%	+0.8%	--	6½	2"
CARRARA CASTLETON	101.1%	100.9%	+0.2%	6½	5 3/4	3½"
	100.8%	101.5%	-0.7%	6	6	3½"
GRISWOLD BURLINGTON	99.8%	99.5%	+0.3%	5½	7	3"
	100.0%	99.9%	+0.1%	5 3/4	6½	--

CLASS AA CONCRETE (cont'd)

CONCRETE PLANT	½ CU. FT. BUCKET YIELD	½ CU. FT. BUCKET YIELD	DIFFERENCE WITH ½ CU. FT. AS STD.	AIR CONTENT PRES. METER/CHASE	CONCRETE SLUMP
KELLEY					
MONTPELIER	101.0%	101.5%	-0.5%	6½	--
MILLER					
W. LEBANON	99.3%	99.7%	-0.4%	6½	3"
	98.3%	97.3%	+1.0%	5 3/4	2"
	100.0%	99.7%	+0.3%	6	2 3/4"
	100.7%	101.1%	-0.4%	7	2 3/4"
	100.7%	101.1%	-0.4%	6	2 3/4"
	100.0%	100.0%	----	7½	--
	98.4%	98.2%	+0.2%	5 3/4	--
	101.0%	100.5%	+0.5%	6 3/4	--

PROJECT _____ LOCATION _____ STRUCTURE _____

YDS. & CLASS CONCRETE _____ FROM _____

AGGREGATE SOURCE

WEIGHTS PER YD.

#1 STONE _____

#2 STONE _____

SAND _____

CEMENT _____

WATER _____ GALS. AT PLANT

_____ GALS. ADDED ON PROJ.

TOTAL _____ GALS. ÷ _____ YDS. = _____ X 8.345 = _____

AIR: CHACE _____ %

SLUMP _____ "

TEMPERATURE _____ °

PRESSURE _____ %

BUCKET & CONCRETE ---

BUCKET ---

CONCRETE ---

X FACTOR ---

WGT. PER FT. ---

WGT. PER YD.

WGT. PER FT.

= _____ =

27

% YIELD

DATE _____

INSPECTOR _____