

CERTIFIED TESTING LABORATORIES, INC.

**DATE:** May 9, 2002  
**LAB#:** 12737  
**CLIENT:** Civetta Cousins JV  
 1100 East 156<sup>th</sup> Street  
 Bronx, NY 10474  
**PROJECT:** World Trade Center, New York, NY  
 Cast in place wall G40 to G44  
**STRENGTH REQUIRED:** 5000 psi plus 25% @ 28 days (regular)  
**SUBJECT:** Analysis of Aggregate and Concrete Mix Design  
**FOR:** Prequalified Trial Mix Design in accordance with  
 NYC Code 27-605  
**SUPPLIER:** Empire Concrete

The following materials were submitted by Empire Concrete as typical of those proposed to be furnished for this project.

|                   |                                   |            |
|-------------------|-----------------------------------|------------|
| Cement:           | Norval 236-59-SM Type I           | ASTM C 150 |
| Fine Aggregate:   | Long Island Natural               | ASTM C 33  |
| Coarse Aggregate: | New York Traprock                 | ASTM C 33  |
| Admixture #1:     | WR Grace Daravair, Cal #679-53-SM | ASTM C 260 |
| Admixture #2:     | WRDA Hycol                        | ASTM C 494 |

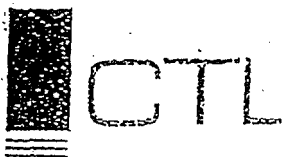
#### COARSE AGGREGATE

##### Gradation Test

| Sieve Size                   | Percent Passing | ASTM C 33 # 67 |
|------------------------------|-----------------|----------------|
| 1"                           | 100.0           | 100            |
| 3/4"                         | 92.4            | 90-100         |
| 1/2"                         | 63.7            | -----          |
| 3/8"                         | 25.9            | 20-55          |
| #4                           | 4.8             | 0-10           |
| #8                           | 2.1             | 0-5            |
| Unit Weight, Dry Rodded..... |                 | 99.8 pounds    |
| Specific Gravity.....        |                 | 2.80           |

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FINE AGGREGATE

Sand

Gradation Test

| <u>Sieve Size</u> | <u>Percent Passing</u> |
|-------------------|------------------------|
| 3/8"              | 100.0                  |
| #4                | 98.2                   |
| #8                | 90.3                   |
| #16               | 78.2                   |
| #30               | 52.3                   |
| #50               | 14.9                   |
| #100              | 3.9                    |

Fineness Modulus.....2.62  
Specific Gravity.....2.64  
Unit Weight, Dry Rodded.....103.0 lbs.  
Colorimetric Test.....Plate #1

Mix data and compressive strenghts of the mixes are as follows. The following figures are for a calculated one cubic yard batch using surface dried materials.

DRY WEIGHTS PER CUBIC YARD

|                            | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> |
|----------------------------|----------|----------|----------|----------|
| Cement, lbs.               | 541      | 611      | 660      | 752      |
| Fine Aggregate, lbs.       | 1265     | 1200     | 1190     | 1180     |
| Coarse Aggregate, lbs.     | 1850     | 1850     | 1850     | 1870     |
| Admixture #1, ozs.         | 5.3      | 5.9      | 6.3      | 6.4      |
| Admixture #2, ozs.         | 21.6     | 24.4     | 26.4     | 30.1     |
| Water, gals.               | 32.5     | 32.0     | 31.6     | 31.6     |
| Air Content, pct. $\pm .5$ | 6.0      | 6.0      | 6.0      | 6.0      |
| Slump, inches $\pm 1/-1$   | 4.0      | 4.0      | 4.0      | 4.0      |
| W/C Ratio, gals/sack       | .50      | .44      | .40      | .35      |
| Unit Weight, PCF           | 145.4    | 145.8    | 146.7    | 148.2    |

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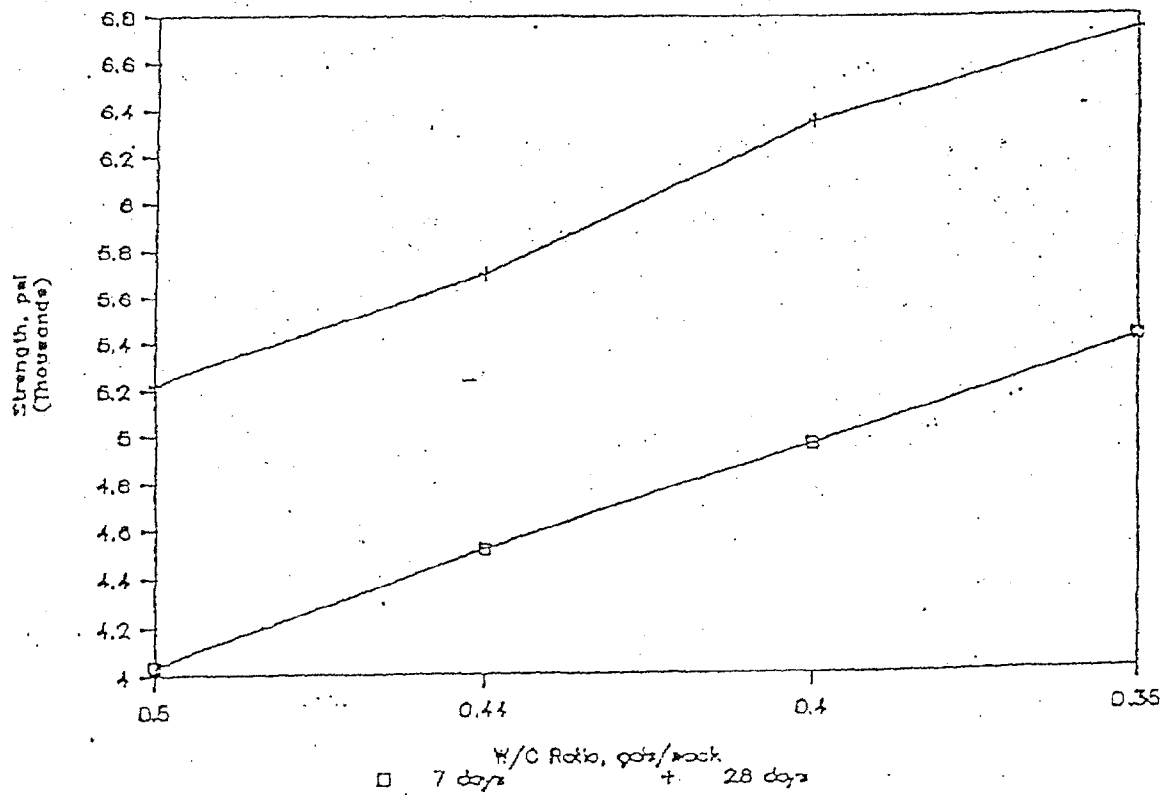


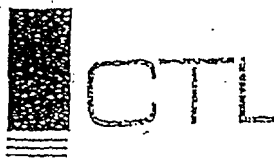
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## Compressive Strenghts

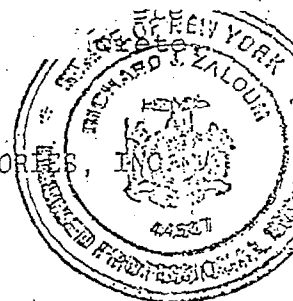
|               | <u>1</u>                     | <u>2</u>                     | <u>3</u>                     | <u>4</u>                     |
|---------------|------------------------------|------------------------------|------------------------------|------------------------------|
| 7 Days (psi)  | 4100<br>3980                 | 4490<br>4550                 | 4990<br>4930                 | 5380<br>5430                 |
| average       | 4040                         | 4520                         | 4960                         | 5410                         |
| 28 Days (psi) | 5270<br>5150<br>5180<br>5270 | 5730<br>5640<br>5660<br>5780 | 6420<br>6380<br>6260<br>6330 | 6720<br>6670<br>6750<br>6830 |
| average       | 5220                         | 5700                         | 6350                         | 6740                         |

Laboratory sized batches were made. Six cylinders were cast for each batch and the preceding test results were obtained from these cylinders. The test cylinders had been stored in a moisture room at the temperature of 72 degrees F and 95% humidity from the date of casting until the date of testing. The cement and water are for a slump of four inches, with aggregates noted ( $\pm$  one inch in field).

Based on our laboratory results, we suggest using MIX #4 for 5000 psi concrete.

NOTE: Add WR Grace Daraset when necessary at rate depending on ambient temperature below 50°F, from 10 oz/100 cw to 40 oz/100 cw. As follows:  
40to50°-10oz/100cw  
30to40°-20oz/100cw  
20to30°-30oz/100cw  
10to20°-40oz/100cw

Respectfully submitted,  
CERTIFIED TESTING LABORATORIES, INC.  
*Richard J. Zaloum*  
Richard J. Zaloum, PE  
NYC CERTIFICATE OF QUALIFICATION #3



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