

| Quantities Per Cubic Yard (Meter) | | | | | | |
|--|------------------------|--------------------------|---------------|------------------------|----------------------------|-----|
| Type of Coarse Aggregate | Dry Aggregates | | | Cement Content lb (kg) | Water-Cement Ratio Maximum | |
| | Fine Aggregate lb (kg) | Coarse Aggregate lb (kg) | Total lb (kg) | | | |
| CLASS C (Using No. 7, 78, or No. 8 Size) | | | | | | |
| Gravel | 1320(783) | 1460(866) | 2780(1649) | 600(356) | | 0.5 |
| Limestone | 1380(819) | 1410(837) | 2790(1656) | 600(356) | | 0.5 |

At any time during the construction period, the relative weights of fine and coarse aggregate as determined from the above table may be varied by the Engineer in order to insure a workable mix within the slump range and to control the yield. However, the total weight of aggregate per cubic yard (cubic meter) shall not be changed except as provided in the preceding paragraph as for the following conditions or both.

(a) For batch weights, the weights determined as described above shall be corrected to compensate for moisture contained in the aggregates at the time of use.

(b) If it is found impossible to prepare concrete of the proper consistency without exceeding the maximum water/cement ratio specified, a water reducing admixture conforming to requirements of 705.12 shall be used or the cement content shall be increased. However, the Contractor shall not be compensated for the admixture or additional cement which may be required by reason of such adjustment.

(c) If, during the progress of the work, the specific gravity of one or both of the aggregates changes, the batch weight shall be adjusted to conform to the new specific gravity.

(d) Unit weight determinations shall be made and the yield shall be calculated and maintained in accordance with ASTM C 138. Based on these determinations, the batch weights will be adjusted when necessary. However, the specified cement content shall be maintained within a tolerance of ± 1 percent and the maximum water-cement ratio shall not be exceeded.

(e) The amount of mixing water shall be adjusted for the moisture contained in the aggregate and for the moisture which they will absorb, in order to determine the amount of water to be added at the mixer.

(f) An approved set retarding admixture meeting the requirements of 705.12, Type B or Type D shall be required for concrete when the concrete temperature exceeds a nominal temperature of 75° F (24° C).

899.04 Proportioning Options. The Contractor may substitute one of the following options for all concrete items: The dry weights specified in these tables were calculated using the same specific gravities used in 899.03. The specific gravity used for ground granulated blast furnace (GGBF) slag is 2.90. Adjustments shall be made to the mix design due to specific gravities differing by more than 0.02. Other adjustments may be made as allowed in 899.03 and approved by the Engineer.

The requirements for Proportioning Option 1 are as follows. The cement content may be reduced as much as 15 per cent by weight with the substitution of an equivalent weight of fly ash meeting the requirements of 705.13. The water/cement ratio shall be based on the combined weight of cement and fly ash. Proportioning Option 1 shall meet the following Mix Design Concrete Table:

| Quantities Per Cubic Yard (Cubic Meter) | | | | | | |
|--|------------------------|--------------------------|---------------|------------------------|-----------------|------------------------|
| Type of Coarse Aggregate | Dry Aggregates | | | Cement Content lb (kg) | Fly Ash lb (kg) | Water-CM Ratio Maximum |
| | Fine Aggregate lb (kg) | Coarse Aggregate lb (kg) | Total lb (kg) | | | |
| CLASS C Option 1 (Using No. 57 or No. 67 Size) | | | | | | |
| Gravel | 1140(676) | 1700(1009) | 2840(1685) | 510(303) | 90(53) | 0.50 |
| Limestone | 1260(748) | 1595(946) | 2855(1694) | 510(303) | 90(53) | 0.50 |
| Slag | 1320(783) | 1330(789) | 2650(1572) | 510(303) | 90(53) | 0.50 |
| CLASS F Option 1 (Using No. 57 or No. 67 Size) | | | | | | |
| Gravel | 1260(748) | 1800(1068) | 3060(1815) | 400(237) | 70(42) | 0.55 |
| Limestone | 1350(801) | 1730(1026) | 3080(1827) | 400(237) | 70(42) | 0.55 |
| Slag | 1380(819) | 1475(875) | 2855(1694) | 400(237) | 70(42) | 0.55 |
| CLASS S Option 1 (Using No. 57 or No. 67 Size) | | | | | | |
| Gravel | 1060(629) | 1640(973) | 2700(1602) | 608(361) | 107(63) | 0.44 |
| Limestone | 1230(730) | 1490(884) | 2720(1614) | 608(361) | 107(63) | 0.44 |
| Slag | 1220(724) | 1300(771) | 2520(1495) | 608(361) | 107(63) | 0.44 |

| CLASS C Option 1 (Using No. 7, 78 or 8 Size) | | | | | | |
|--|-----------|-----------|------------|----------|--------|------|
| Gravel | 1310(777) | 1440(854) | 2750(1631) | 510(303) | 90(53) | 0.50 |
| Limestone | 1350(801) | 1410(837) | 2760(1638) | 510(303) | 90(53) | 0.50 |

The requirements for Proportioning Option 2 are as follows. The cement content may be reduced as much as 50 pounds per cubic yard (30 kg/m³), with the substitution of an equivalent volume of aggregate, provided the Contractor uses an approved water reducing admixture meeting the requirements of 705.12; Type A or Type D. Proportioning Option 2 shall meet the following Mix Design Concrete Table:

| Quantities Per Cubic Yard (Cubic Meter) | | | | | | |
|--|------------------------|--------------------------|---------------|------------------------|----------------------------|------|
| Type of Coarse Aggregate | Dry Aggregates | | | Cement Content lb (kg) | Water-Cement Ratio Maximum | |
| | Fine Aggregate lb (kg) | Coarse Aggregate lb (kg) | Total lb (kg) | | | |
| CLASS C Option 2 (Using No. 57 or No. 67 Size) | | | | | | |
| Gravel | 1190(706) | 1785(1059) | 2975(1765) | 550(326) | | 0.50 |
| Limestone | 1320(783) | 1675(994) | 2995(1777) | 550(326) | | 0.50 |
| Slag | 1385(822) | 1395(828) | 2780(1649) | 550(326) | | 0.50 |
| CLASS F Option 2 (Using No. 57 or No. 67 Size) | | | | | | |
| Gravel | 1315(780) | 1880(1115) | 3195(1896) | 420(249) | | 0.55 |
| Limestone | 1410(837) | 1810(1074) | 3220(1910) | 420(249) | | 0.55 |
| Slag | 1445(857) | 1540(914) | 2985(1771) | 420(249) | | 0.55 |
| CLASS S Option 2 (Using No. 57 or No. 67 Size) | | | | | | |
| Gravel | 1120(664) | 1710(1015) | 2830(1679) | 665(395) | | 0.44 |
| Limestone | 1290(765) | 1560(926) | 2850(1691) | 665(395) | | 0.44 |
| Slag | 1270(753) | 1370(813) | 2640(1566) | 665(395) | | 0.44 |

| CLASS C Option 2 (Using No. 7, 78 or No. 8 Size) | | | | | | |
|--|-----------|-----------|------------|----------|--|------|
| Gravel | 1370(813) | 1510(896) | 2880(1709) | 550(326) | | 0.50 |
| Limestone | 1420(842) | 1480(878) | 2900(1720) | 550(326) | | 0.50 |

The requirements for Proportioning Option 3 are as follows. The Portland cement content may be reduced as much as 50 pounds per cubic yard (30 kg/m³) with the substitution of an equivalent volume of aggregate, provided the Contractor uses an approved water-reducing admixture meeting the requirements of 705.12, Type A or D. The cementitious materials content shall consist of a combination, by weight, of a minimum of 70 percent Type I or Type IA Portland cement (701.04 or 701.01), and a maximum of 30 percent ground granulated blast furnace slag, ASTM C 989, grade 100 or 120. Proportioning Option 3 shall meet the following Mix Design Concrete Table:

| Quantities Per Cubic Yard (Cubic Meter) | | | | | | |
|--|------------------------|--------------------------|---------------|------------------------|-------------------|------------------------|
| Type of Coarse Aggregate | Dry Aggregates | | | Cement Content lb (kg) | GGBF Slag lb (kg) | Water-CM Ratio Maximum |
| | Fine Aggregate lb (kg) | Coarse Aggregate lb (kg) | Total lb (kg) | | | |
| CLASS C Option 3 (Using No. 57 or No. 67 Size) | | | | | | |
| Gravel | 1185(703) | 1775(1053) | 2960(1756) | 385(228) | 165(98) | 0.50 |
| Limestone | 1310(777) | 1670(991) | 2980(1768) | 385(228) | 165(98) | 0.50 |
| Slag | 1385(822) | 1385(822) | 2770(1644) | 385(228) | 165(98) | 0.50 |
| CLASS F Option 3 (Using No. 57 or No. 67 Size) | | | | | | |
| Gravel | 1320(783) | 1870(1109) | 3190(1892) | 294(174) | 126(75) | 0.55 |
| Limestone | 1400(831) | 1810(1074) | 3210(1905) | 294(174) | 126(75) | 0.55 |
| Slag | 1440(854) | 1535(911) | 2975(1765) | 294(174) | 126(75) | 0.55 |