CONCRETE MIX DESIGN BY CONVERGENCE

A thesis, submitted for the degree of Ph.D. of the University of Cape Town, by W. H. King.

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S Y M B O L S

In one pocket mixes, i.e. mixes containing 94 pounds of cement:-

W = weight of water in pounds.

C = weight of cement in pounds = 94 pounds.

S = weight of fine aggregate in pounds, i.e. of aggregate <u>smaller</u> than 3/16 inches.

L = weight of coarse aggregate in pounds, i.e. of aggregate <u>larger</u> than 3/16 inches.

A = weight of total aggregate in pounds in one pocket mix
= S + L.

V = prefix for volume yielded in cubic feet, as in VW, VC, VS, VL, VA.

Y = total yield of voidless concrete in cubic feet = VW + VC + VA

D = prefix for amount of change; D is an operator as in DW, DC, DA, and the like.

In unit volume of voidless concrete:-

w = weight of water.

c = weight of cement.

s = weight of fine aggregate.

l = weight of coarse aggregate.

a = weight of total aggregate = s + l.

VW% = percentage contribution by water towards a total yield of unit volume. % is a suffix showing VW has been divided by Y and multiplied by 100.

Similarly for VC%, VS%, VL%, VA%.

V_W = proportion of unit yield provided by water = VW/Y.

Similarly for V_C and V_A. See triangular diagrams.

GENERAL:-

CF = Compacting Factor.

SL = Slump.

WIG = Wigmore number.

VB = Vebe number in seconds.

FM = Fineness Modulus.

D = Density of voidless concrete in pounds per cubic foot.

T = Theoretical Mortar Excess.

R = Real Mortar Excess.

U = Unit water content in pounds per cubic yard.

J = Identification number for a concrete mix.

g_w = Specific gravity of water = unity.

g_c = Specific gravity of cement and likewise g_s, g_1, g_a for fine aggregate, coarse aggregate and combined aggregate.

D = Prefix for change; D is an operator as in DCF, DSL, DU, DFM and the like.

$\frac{W}{C} = \frac{w}{c}$ = water/cement ratio by weight.

$\frac{A}{C} = \frac{a}{c}$ = aggregate/cement ratio by weight.

PARTICULAR:-

Basic equations and relations derived from them

AME, RME, TME = Apparent, real and theoretical mortar excesses.

V_L = Yield of coarse aggregate in unit volume yield of concrete.

k = Ratio of voids to solid content of dry coarse aggregate.

K = Constant, distinguished by suffixes e.g. K_1, K_2 etc.

Road Note No.4, etc.

VL, L, M, H = Very low, low, medium and high workabilities.

Murdock

f_s = SF = Surface index

f_a = Angularity index

%S = Percentage of sand by weight in combined aggregates.

Popovics

CB, CP, CS = Cement content in bags per cubic yard of concrete; in general and for stiff and plastic mixes respectively.

WP, WS = Unit water content for plastic and stiff mixes.

SF, SM = Sand weight per pocket using fine and medium sands.

LF, LM = Stone weight per pocket using fine and medium sands.

m = FM = Fineness modulus of sand

SAND F, SAND M = Proportion of fine and medium sand in combined aggregate to obtain m.

One Pocket Mix Tables

TOT = Total weight of ingredients in one pocket mix.

SW%, SV% = Percentage of sand in combined aggregate, by weight and by volume.

A Note on the Tables of Appendix 1

In order to place as much information about one pocket mixes as possible on the computer pages, the writer has suppressed decimal points to economise print along the lines; this practice has, in general, been maintained where it was not so essential. Accordingly the values in columns under the following symbols have been multiplied by 10 in general:-

D = Density of concrete in pounds per cubic foot;
VW%, VC%, VS%, VL%, VA% = the percentage yields from the constituents in unit volume of finished concrete;
SW%, SV% = the percentages of sand by weight or volume in the combined aggregates;
? SL ap II S = slump in inches.

The following have been multiplied by 100 in general:-

VW, VS, VL, VA = the yield from these constituents in cubic feet for a one pocket mix;
W/C, A/C = water/cement ratio, aggregate/cement ratio; by weight
%S = the percentage of sand in combined aggregate in the Murdock analysis;
CF = compacting factor.

In the Murdock analysis, SF, his surface factor was multiplied by 1000.

In analyses of DA/A/one inch change in slump or DA/A/0.01 change in compacting factor these items have been multiplied by 10,000.

When the observations of real mortar excess, slump, Wigmore number, or compacting factor have not been taken it is easier to enter a fictitious number than to arrange for a gap in the column. The writer reserved 99, 99, 999 and 9 respectively for unknown values of these functions.

Over 95% of the programming, card punching and production on the computer is the work of the writer. For help in the remainder he is indebted to Dr. Brundrit and to the staff of the University Computer Centre. He takes this opportunity of acknowledging their help and of thanking them.

FOREWORD

"Concrete mixtures should be designed to give the most economical and practical combinations of materials which will produce the necessary workability in fresh concrete, and the required qualities, in the hardened concrete."

Portland Cement Association, 1952.

SUMMARY

The writer proposes an original technique for the systematic and rapid convergence upon a concrete mix with the desired properties, achieved by the simultaneous adjustment of the workability and the mortar conditions in trial mixes, according to the nature and magnitude of the faults they show in these properties. An original analysis of a number of reputable methods of mix design has been performed to show the relation of the proposed method to these. The results of applying the technique in practice are given in the form of records for over 250 mixes made by a large number of different operators.

TERMS OF REFERENCE

The writer has confined himself to discussion of the properties of fine and coarse aggregates, and of the properties of cement pastes, mortars and concretes, only in so far as they affect the workability or the placing of the concrete, and descriptions of standard tests for these properties have been omitted. It has been assumed further:-

(i) that the water/cement ratio has already been specified on a basis of strength and durability or, alternatively, that a number of selected water/cement ratios are to be used and strength tests, on samples of the final mixes in each case, will follow to check this aspect of the mix design;

(ii) that the workability has been chosen to suit the nature of the work, the method of compaction, the size and shape to be cast and the degree of obstruction by reinforcement;

(iii) that the aggregates are sufficiently inert to ensure that no objectionable or injurious reactions will occur to the detriment of the concrete and that they are of acceptable cleanliness, i.e. not suffering from either surface coatings or dangerous organic content;

(iv) that air-entrainment is not contemplated.

FACTORS INFLUENCING THE WORKABILITY OF CONCRETE

(i) The Viscosity of the Cement Paste.

One can consider the mixture of water and finely ground particles of cement as a lubricant. Its virtues in this respect vary with the water/cement ratio, with the extent of hydrolysis, and with the associated thixotropy if the material is left quiescent before being further manipulated. In general, on engineering works, considerable haste is shown in both mixing and transporting, and then placing concrete, so that the hydrolysis does not usually proceed very far, and little opportunity is afforded for stiffening before placing. Special precautions are necessary on long hauls of ready-mixed concrete. Thus the dominant feature is water/cement ratio. It is well known that it is easier to design a mix of satisfactory workability at ratios of 0.5 to 0.6 than at either above or below this range.

At a water/cement ratio of about 1.0, the paste is so thin that the aggregates grate together harshly and it is a poor lubricant. There is a strong tendency for the paste to flow away from the aggregates during transportation and placing. Therefore, one of the most difficult tasks of a concrete mix designer is to find a good solution to the problem when a very weak mix is requested. In addition to the above trouble, weak mixes are commonly sensitive to small changes in aggregate grading and shape, largely because the paste is so watery. Granger went so far as to state that there is no justification for a water/cement ratio as high as 0.7 by weight and pastes as wet as this should never be used. (34). The writer cannot agree with this opinion but it illustrates his point.

At the other end of the scale water/cement ratios in the region of 0.35 render the paste viscous and good adhesion to the aggregate is evident. The mortar coats and clings to the coarse aggregate and there is little fear of segregation or sensitivity. The viscosity of the paste is the only cause of difficulty, for the effects of hydrolysis are magnified and, even during short periods of transportation, the workability of the mix may change noticeably. The effect is thixotropic since reworking restores the earlier workability almost completely but this reworking has to be made part of the process of tamping or vibrating the concrete into place. Therefore it may be considered necessary to provide extra workability at the mixer to offset the stiffening and reduce the difficulties of placing.

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The graphs in Granger (34), illustrate the phenomenon very well, for he used a method of measuring workability which was sensitive to its effects.

The chemical nature of the cement itself affects the viscosity at constant water/cement ratio by altering the rate of reaction, and the products formed. The rate of reaction may also be changed by fineness of grinding. The alterations to viscosity from these causes are not so important as those caused by the variation of water/cement ratio.

(ii) The Distribution of Particle Sizes in the Aggregate.

The general aim of a good grading is to obtain a concrete which is economical in the use of cement; the aggregate/cement ratio is as high as it can be for the stipulated water/cement ratio. Yet this must be accomplished without failing to provide concrete which can be compacted to an acceptable minimum of air voids, under the conditions of placing, and which will not segregate nor suffer from excessive bleeding. In any set of circumstances, there must be an optimum grading. It is found too that, commonly, there are many gradings which will give results very near those of the optimum. Nevertheless, it is not so easy as it appears to choose a suitable grading in practice. In the light of innumerable investigations into the problem, and many prescriptions of ideal curves, one can see the factors in grading which influence workability; but it is a different matter trying to evaluate their influence and applying the results of this evaluation to settle the question. Moreover, one cannot afford to sieve aggregates into very many fractions with a view to re-combining them to match an optimum grading, especially if the limits of tolerance are narrow. In 1948, sixty million dollars were spent on this in the United States, " because it was economical to do so " (32). Boyd Mercer, in stressing the expensiveness of modifying the grading of fine aggregates in particular, declared that gradings readily available should not be rejected solely on the grounds of non-compliance with some grading previously accepted as a basis (27). The writer agrees strongly with this view. At the other end of the scale, Walsh said that if the aggregates cannot be combined so as to produce close enough agreement with the type grading, other aggregates must be sought (64). It would be preposterous to take a stand like this in South Africa, where, over large areas, aggregates to match Walsh's type gradings could not be found at all. Therefore, the mix designer must use his knowledge of the general way in which grading influences workability, so that he may make a reasonably good preliminary choice of the proportion of fine aggregate to coarse aggregate and correct this, if need be, by trial and error.

In the first place, the grading of the fine aggregate has far greater effect upon the workability than the coarse aggregate. A coarsely graded sand promotes harshness and, if its use cannot be avoided, its proportion in the total aggregate is raised above the normal and a lower water/cement ratio than that specified for other reasons may have to be employed deliberately to offset the harshness. This can still prove more economical than transporting a more suitable sand from a distant source. A finely graded sand is used in lower proportions than normal but may nevertheless cause a drop in the aggregate/cement ratio because of its excessive surface area, discussed later.

[illegible] cement?

However, the grading has to be considered in conjunction with the water/cement ratio of the paste. In the case of rich mixes a coarser overall grading is possible, i.e. a lower proportion of sand is permissible on the grounds of paste viscosity and because the cement is supplying more fines than is the case in normal mixes. The converse applies to lean mixes with watery pastes. The situation may be summarised by saying that a lower cement content demands a finer grading and a higher cement content permits a coarser grading in the combined aggregates.

It will be disadvantageous, almost without exception, for economy in cement, if there is an excessive amount of any fraction, but it may yet pay to use the material as it is in preference to spending time and money on its improvement. Deficiencies in a fraction may also be a disadvantage except in the case of properly designed gap gradings from which sizes considered incompatible are omitted (24,27,28,55,59).

(iii) The Shape of the Aggregate

It is obvious that flaky and elongated particles of aggregate having sharp arrises will be more reluctant to re-orientate themselves in the matrix when the concrete is being placed and compacted than will rounded particles whose shape approaches the sphere. The closeness of packing in relation to the work done in compacting the concrete is less satisfactory in the former. It can be improved by providing more fine material between the angular fragments e.g. more sand for angular stone, and more very fine aggregate or more cement for angular fine aggregate. One could describe this loosely as the provision of more turning space and more rollers on which to turn during packing. There is a limit to this process of improvement, imposed by surface area effects. It does not appear possible to apply measurements of shape simply and directly to mix design, they are more used for the rejection of aggregates for non-compliance with specified standards. Since this occurs mostly with stones obtained by crushing material from sources such as thinly bedded shales or stone in a state of stress before being crushed or stone in which cleavage along crystal boundaries is easy, one may have to use such stone, despite non-compliance. This is the case in the Cape Town area.

(iv) The Surface Area of the Aggregate

The cement paste has to coat all the aggregate particles for lubrication and for the development of strength. A larger surface area demands a larger quantity of paste, for equal workability and it is uneconomical to supply the extra cement unnecessarily. It is evident that the higher the proportion of sand associated with a fixed quantity of cement paste the lower will be the workability, as the paste is extended to a thinner layer. Alternatively, if the workability is kept constant, the substitution of a finer sand for a coarser will compel the designer to use a lower aggregate/cement ratio: provided that the voids condition of the coarse aggregate is little affected by the substitution. The subject is discussed further in the next section and in methods of mix design, later.

(v) <u>The Voids in the Aggregate</u>

If a single size of coarse aggregate is used, the cement paste must fill all the voids in this. Therefore if smaller particles are introduced to displace the cement paste, an economy is effected. The unknown factor is the extent to which the smaller particles will insinuate themselves between the larger ones, so far considered to be in contact, without disturbing the voids pattern and hence the voids to be filled. If the coarse aggregate comprises several fractions, disturbance will occur more readily and coarse sand will have a greater effect than fine sand. Thus it is seen that a compromise between packing together a variety of sizes to get minimum voids and keeping surface area down by avoiding the use of fine particles leads once more to the concept of an optimum grading. Theoretical studies of packing are to be found in Delavalle's "Micrometics" and in the works of a number of French writers on granulometry (28, 61, 62).

(vi) <u>The Surface Texture of the Aggregate</u>

The rougher the aggregate surface the greater is the area that has to be coated with paste to promote the desired workability and the greater is the resistance, through friction, to packing. The surface area is so closely related to the texture that it is used often as an indicator of roughness.

Glassy smoothness is not desirable in an aggregate, being associated with poor bond, and strength tests, not workability, show when smoothness is detrimental. Therefore, no account is taken of surface texture in mix design methods, for there is no easy way of measuring it nor of knowing how to apply such measurements.

(vii) Water Absorption by the Aggregate

A dry aggregate, of an absorbent nature, will compete with the cement for the water in the paste. The amount thus withdrawn ceases to be available for lubrication, the paste becomes more viscous and the workability is reduced. Thus the amount of water which will be absorbed during the period of mixing, transporting and compacting has to be estimated, and supplied as extra over the mixing water dictated by the water/cement ratio, in order to offset the loss of workability. The absorption in ten minutes is usually taken as the criterion but more detailed studies are to be found in the writings of Newman (45), Shergold, and many others. Where dessication of the aggregate in a hot dry climate is expected, the mix should be designed using dry materials as a basis; hosing of stockpiles is not a good cure, it only creates trouble by causing wide variation in the water carried into the mix by the aggregate.

(viii) <u>The Uniformity of the Aggregate</u>

If the aggregate is not uniform in any of the properties described above then the workability is affected to a greater or lesser degree. It may be serious enough to warrant adjustment of the mix from time to time. On the other hand it may be small enough for provision to be made for the fluctuations by designing a mix of somewhat higher workability than is essential for the average run of the aggregate. The expense of this might be regarded as insurance against having to cut out or patch up defective concrete.

SURVEY OF MIX DESIGN METHODS

Different methods of mix design are all attempts to resolve the problem of how to associate water, cement, fine aggregate and coarse aggregate to the best advantage towards the end in view. When the water/cement ratio has been stipulated, the problem reduces to finding the value of the aggregate/cement ratio and the relation of fine aggregate to coarse aggregate. The former is to be as high as it can be; the latter is to reduce the paste and, with it, the cement content to the lowest value possible. It has been indicated that the conflict is between reducing voids on the one hand, so that a low volume of paste is required to fill them, and keeping surface area low, so that as little paste as possible is claimed as lubricant coating over the particles.

Opinions differ as to the relative importance of voids and surface area in reaching the decision, as to how to measure them and as to how to apply the measurements. Abram's classification in 1918 of current mix design methods, listed:

(a) Arbitrary proportions.

(b) Maximum density of aggregates.

(c) Maximum density of concrete.

(d) Grading curves.

(e) Surface area of aggregates.

All of these methods, or combinations of them, are still in use despite condemnations of each by supporters of one of the alternatives. The chief progress has been the acquisition of more information about the results of applying the system under different circumstances and about the effects of varying the parameters. The latter is invaluable when mix adjustment has to be made.

A survey of methods, classified as above, follows.

(a) Arbitrary Proportions, Nominal Mixes, Standard Mixes or Mix Tables

The traditional mixes by volume in the arbitrary proportions of 1 : n : 2n of cement : fine aggregate : coarse aggregate are well known. They are completely satisfactory only under special circumstances - that allowance has been made for the bulking of the sand, if it is damp, that the stone shall not be ill-shaped, that the aggregates are well graded in the sense of having no fractions predominating i.e. they give a smooth grading curve or good approximation to a designed gap grading, that the maximum size is 3/4 inches, and that the paste viscosity is not too watery. With small departures from the above circumstances, they are commonly regarded as adequate for some forms of building construction and appear regularly in contract documents. With marked deviations from the requirements stated above, some very badly honeycombed concrete has resulted. In general, they cannot be regarded as economical in the use of cement but the work for which they are intended may not warrant the expense of a more careful investigation.

The covering word "nominal" is frequently used in conjunction with these arbitrary proportions. This is construed to mean that some variation from 1 : n : 2n will be tolerated, provided that it can be shown that the mix is better, but that any increase of the aggregate/cement ratio by volume above the value 3n will be viewed with suspicion. Limits may be placed on tolerance allowed (7, 1957).

The term standard mix appears in the 1965 amendment to CP 114 whereby nominal mixes by volume are replaced by mixes of dry aggregate by weight per bag of 112 pounds of cement (7, 1965). The weight of sand is fixed for each type of mix for sand in Zone 2, (1), and the alterations required by change of sand zone are laid down for both sand and stone. The weight of stone changes according to both workability and maximum size of aggregate. The water/cement ratio is specified through 28 day minimum strength of works cubes with an associated standard deviation of 1000 pounds per square inch or less. CP 116 may be consulted for other standard mixes if the control of the concrete will result in a standard deviation of 500 pounds per square inch or less. In exceptional circumstances, designed mixes are permitted. These are subject to boundary conditions of maximum water/cement ratio, minimum compacted density and maximum aggregate/cement ratio with minimum cement content.

The differences between arbitrary mixes and standard mixes are in themselves a measure of the unsatisfactoriness of the former; they are replaced by tables of mixes covering various workabilities, strengths, aggregate/cement ratios, percentages of fine aggregate and maximum sizes of aggregate. Since these are embodied in codes of practice one would not expect to find information on adjustment and there is none. The implication is that if the aggregates it is proposed to use fail to satisfy the requirements for workability, when made up into concrete as directed, then the aggregates are to blame. It seems doubtful whether this would be regarded as a recognised exception warranting a designed mix. The tables seem to differ, therefore, from most mix tables in that they are not a basis for trial mixes.

Many sources of mix tables are available, some of them very brief (19), some very detailed (21,1938) but most giving an indication of the issuing authority's view upon the factors that are important in solving the problem. If schemes for adjustment of mixes are provided, particularly numerical methods, they are more illuminating still. The writer has attempted to fit the more important ones, according to his views of the essential features, into Abram's classification.

(b) Maximum Bulk Density of Combined Aggregates

If varying percentages of a given dry fine aggregate are mixed with a given coarse aggregate, an optimum percentage can be found, which gives the maximum bulk density, with the least voids (assuming the specific gravities are not greatly different). This is a tempting solution. There are two causes of breakdown, either the aggregates behave differently when cement paste is present and the resulting mixes are oversanded or the degree of compaction at which the density is measured does not correspond to that in the concrete.

A variant on the above, Dana's method, requires the determination of the voids in the fine aggregate and in the coarse aggregate separately as a first step. The second step is to add to the coarse aggregate just enough volume of fine aggregate to fill the voids in the coarse aggregate and the third step is just to fill the voids in the amount of fine aggregate so added with a volume of paste of the desired water/cement ratio. The solution has therefore established in theory both aggregate/cement ratio for the mix and the percentage of sand. Except in the special circumstances described later in this section, the method fails because no account has been taken of the disturbance of the voids pattern of the dry coarse aggregate consequent upon introducing fine aggregate, nor of the same effect when paste is added to sand. The mixes exhibit deficiencies of mortar, so modifications of the method consist of compensation for the disturbances by adding extra sand over that required for stone voids and extra paste over that required to fill the voids in the added sand. As the extras required vary greatly with the shape and grading of the aggregates, they become a matter for guesswork.

There are special circumstances in which the method will succeed. Stewart's method is an application of Dana's concept, whereby with vibration, gap grading and careful selection of the fine aggregate it can be arranged that the original voids condition as measured in the dry aggregate, is reproduced in the finished concrete. (58,59). The weight of aggregate in one cubic foot of voidless concrete, (a), is calculated from equation (2)* using the known value of water/cement ratio and an associated value of the aggregate/cement ratio furnished by Stewart. The contribution towards (a) which the stone can make is known from measuring its weight per cubic foot, after vibration in the dry state, and the deficit is made up by adding the necessary weight of sand, so that the combined weights equal (a). The risk of mortar deficiency is not entirely excluded, for insufficient vibration, or too high a value for the aggregate/cement ratio, will cause defective packing and an over estimate of the bulk density.

*See p.28

of the stone will cause a sand deficiency. When the writer is designing by Stewart's method he does not vibrate the stone for bulk density determination, but he does vibrate when assessing if the sand to be used will flow in a dry state through the packed dry aggregate.

It is therefore essentially from consideration of bulk density of aggregate before incorporation in the concrete that all these methods are derived and therefore they are voids methods. Gradings and surface areas are incidental.

(c) Maximum Density of Concrete

The idea of maximum density of concrete is usually associated with Fuller and Thompson (30) but their methods belong more properly to the category including type grading curves, because the attainment of maximum density was through an ideal form of grading curve of cement and aggregate (and was further associated with the use of the largest permissible maximum size of aggregate and with the use of the smallest percentage of fine aggregate possible without producing mortar deficiencies). The amount of mixing water was to be judged by field requirements.

The laborious method from the studies of Talbot and Richart (60) has the maximum density of concrete as an underlying theme. Shorn of the complexities of cement-space ratio, relative water content and ratio of absolute volume of fine aggregate to absolute volume of cement, all devices for choosing the workability and the water/cement ratio, the essence of the method is that the coarse aggregate shall be the diluent for mortar and as much of it shall be used as the conditions permit.

It has to be added that one could classify every method, which causes one to use as little cement paste as the conditions permit, as a method falling into this group, on the grounds that maximum density will follow the use of the minimum content of the least dense material. However, the intention here is to classify more by fundamentals of procedure than by motive.

(d) Grading Curves - Fineness Modulus

There are two ways in which grading curves may apply to mix design.

The first is where restrictions in the form of grading limits are imposed on fine and on coarse aggregates separately, (1,18), or are imposed on the combined aggregate, (17). In the former case, it is assumed that when one has aggregates complying separately with the requirements then these may be combined, over a reasonable range of percentages of fine aggregate, without risk of failure due to bad grading. The choice of the percentage of fine aggregate is usually left to the designer. The latter case makes no stipulation as to individual gradings of fine or coarse but does restrict the percentage of fine aggregate which may be used and also restricts deviations, at any size, thought to be dangerous. The limits of grading, in either case, are generally wide; in the first case this is because concrete can be made, with about equal success, from a wide variety of constituent aggregates and, in the second case, stringency involves unnecessary expense in sieving, stockpiling and recombining. Where the tolerance is small, as in the case of Walsh (64), who advocates the rejection of aggregates which cannot be so combined as to fit his type gradings, some extraordinarily expensive concretes would result in South Africa.

The second application of grading curves is through the provision of type gradings or formulae for ideal gradings. Instructions on how they are to be used in concrete manufacture must accompany them, viz., some method of finding the appropriate water/cement ratio and aggregate/cement ratio and also of recognising the limits of their applications, (3,26,27,28,30,43,61,62, 64). Backed by adequate investigation, grading curve methods are to be regarded as safe ways of designing, not necessarily giving the ideal all the time but ensuring that concretes unfit for use will occur very very rarely. Manifestly, these systems cannot apply however if the aggregates available cannot be combined to match the gradings basic to the operation, either economically or at all.

Proposed by Abrams, (22), and used by him in his nomographic chart for mix design, is the Fineness Modulus of an aggregate, calculated from the sieve analysis. He considered that aggregates having the same fineness modulus were interchangeable in concrete mixes without significant changes in workability and strength. One may look upon the fineness modulus as a tool for the portmanteau description of aggregate fineness. It is one hundredth of the sum of the percentages retained on each of the sieves of a series in which the finest is the No.100 sieve, of aperture 0.0059 ±0.0001 inches, and the larger sieves double in aperture at each step. Therefore, if the cumulative percentage by weight passing each sieve is plotted upwards on a base of log sieve aperture, with the finest material at the left and the coarsest material at the right, the area above the curve is closely related to the fineness modulus. *Another way of describing it is that it is* rank of the mean size, if the fractions from finest to coarsest are themselves ranked 1, 2, 3, etc. Material passing the No.100 sieve is given rank zero. Thus it can be seen that, because it is possible to have many alternative boundaries enveloping the same total area, the fineness modulus does not define grading.

It may be used to describe aggregates e.g. about 2.0 indicates a fine sand, about 2.7 indicates a medium sand, about 3.0 indicates a coarse sand. It may be used to place limits upon acceptable sands e.g. that they shall have fineness moduli between 2.3 and 3.1 (18) or between 2.5 and 3.0 (17). It is significant that the South African limits are 2.0 to 3.5, and that, in South West Africa, sand of 1.5 fineness modulus has to be used upon occasion. The fineness modulus may be employed also to set limits to the range accepted in combined aggregates, varying with the maximum size of coarse aggregate : for 3/4 inch, 6.5 ± 0.30; for 1.1/2 inch, 6.8 ± 0.30; for 3 inch, 7.4 ± 0.30, (32) and so forth. Finally it may be used as a function in a mix design formula as in Popovics, (48,49,50), discussed later.

(e) Surface Area

Methods which depend solely on surface area, as a criterion for assessing the aggregate/cement ratio and the percentage of fine aggregate suitable for a chosen water/cement ratio, are not used extensively (14,29,38). There is considerable difficulty in measuring surface area directly; approximations derived from sieve analyses are open to doubt, because estimates of shape and surface texture are both involved; indeed, doubts have been expressed that a simple relation exists between workability and specific surface except in oversanded mixes, (56). McIntosh states that "these methods are likely to be little more accurate than a visual assessment based on a moderate amount of experience", (43). The writer agrees, and adds that he considers the amount of work involved in them not worth while designing a mix,,by these methods.

The earliest work of an extensive nature upon the subject was by Edwards, (29). He concluded that it was practicable to proportion cement and aggregate on the basis of the surface area of the latter. He found the surface areas per unit weight by measuring representative groups of particles in different fractions and calculating the surface area of equivalent spheres. The supplement to Edwards' work was by Young, (68). He applied a combination of the surface area theory of Edwards and Abram's water/cement ratio law in the field, testing trial mixes for construction. He found that the most economical mix had the lowest area per cubic foot of material, provided that it could be handled and placed.

Another application of surface area theory is suggested by Newman and Teychenné (14). "If the combined aggregate grading is changed in such a way that the overall specific surface is changed, concrete of different proportion will be obtained; but, if the combined grading is so changed that the overall specific surface is kept constant, then concrete having the same properties can be obtained". (Thus fineness modulus and specific surface are both credited with the same property, and the latter is much more easily found). However the authors proposed that, according to their findings, certain aggregates could be used in conjunction with Road Note No.4 designs, i.e. aggregates which could not be so combined as to approximate to Road Note No.4 gradings; but which could be combined to give specific surfaces equivalent to such gradings. This is directed towards making it possible to use a greater number of sources of sand in Britain, and is of interest in areas such as South Africa. However there seem to be easier methods of achieving the same goal.

The discussion on the paper, (14), contains Dr. Singh's formula,

$$CF = \frac{w/c}{1.21P + 0.0005(a/c)S_o + 0.0604(a/c)(w/c)}$$

where the symbols have the meaning assigned earlier, except P = the amount of water required to produce standard consistency of paste as defined in B.S.12 for Portland cements and S_o = specific surface of the aggregate in square centimetres per gramme. An expression of this nature has the stamp of curve fitting to laboratory data and refers to one type of aggregate only (not stated). The writer is very reluctant to use relations like this. However, if substantiated by further work on various aggregates, it may help to explain some of the anomalies in concretes.

(f) Composite Methods

Certain methods of mix design show evidence of an effort to take into account both the voids condition in the mix and the influence of high surface area in the fine aggregates.

Murdock's formula, analysed later, is one example, (44). Hughes' method is another, (38).

Hughes introduces two measures, grading modulus and mean particle size, from which the qualities of the aggregate are judged. The grading modulus is a measure of the surface area per unit volume, based conventionally upon spheres. A function resembling the centre of gravity of the two gradings moduli, of fine and coarse aggregates respectively, is shown to have a linear relation to the Compacting Factor for any series of mixes in which the unit water content is kept constant. The product of grading modulus for the coarse aggregate alone and of its mean particle size is shown to be related to the optimum coarse aggregate content. There are some curious assumptions involved - that within a fraction from the sieve analysis the proportion by volume smaller than a given size varies as the size and also as the log size. Hughes adopts the concept of constant coarse aggregate in optimum mixes, i.e. alterations in cement yield cause equal and opposite changes in sand yield per unit volume of concrete. This is like the stone factor in American practice and the writer's equations 19 to 21 explain the source of the assumption.

Zietman's method is a further example, (69). From the analysis of over one hundred mixes, all designed according to the American Concrete Institute method, he proposed a relation for the unit water content in pounds per cubic yard as related to the voids in the aggregates, separately, and to the standard deviation of the particle size distribution in the fine sand.

$$\begin{aligned} U = {} & 810 \text{ (voids fraction in sand)} \\ & + 316 \text{ (voids fraction in stone} - 0.435) \\ & + 34.5 \text{ (standard deviation} - 1) \\ & + 50 \text{ pounds per cubic yard.} \end{aligned}$$

The expression applied to concretes having between 3 and 4 inches slump and the standard error in U for the tests was about 2%, for widely different types of aggregate.

As has been indicated earlier, the fineness modulus may be considered as the rank of the mean size of particle in a grading when the sieved fractions are ranked in order 1, 2, 3, ... n, from the first fraction, whose lower limit is the No. 100 sieve. Therefore the variance is fairly easy to calculate using the ranks.

Variance x 100 =

$$\sum_{1}^{n} (\text{percentage by weight in fraction})\ (n - FM)^2$$

The standard deviation is then the square root of the variance thus obtained.

Fulton and West, (32), have rearranged Zietsman's expression to make easier the evaluation of U, (now called water demand of aggregates but meaning the same as unit water content). For any single maximum size of stone, they have subdivided U into three parts. The first is solved by consideration of the proportion of voids in the sand found as described in B.S.S.882, (1), and the fineness modulus. The other two parts are corrections found firstly from the standard deviation of the particle size distribution of the fine aggregate and secondly from the voids in the stone, again determined by the method of B.S.S.882. In making the rearrangement Fulton and West have used a relation derived from the American Concrete Institute method, (20), that the stone content in pounds per cubic foot of concrete equals the rodded bulk density of the stone times (a constant - 0.1 x FM of the sand). The constant is the same for a given maximum size of stone, irrespective of alteration of cement or water content, because it stems from the constant stone factor, mentioned above in the comments upon Hughes' method. The overall effect of this treatment is discussed in the section on the writer's examination of Fulton's work; which is followed by the examination of the A.C.I. method, (20), the P.C.A. method, (19), and the Bureau of Reclamation method, (21), all of which are closely allied examples of American practice in the reconciliation of the voids condition and surface area in the aggregate, and all of which subscribe to the unit water content method of adjustment.

The method of Erntroy and Shacklock, (12), has been included in the group of composite methods. Noting that, in mixes where strengths over 5000 pounds per square inch at age 28 days were needed, the type of aggregate, its shape and the cement content of the mixes had considerable influence on both strength and workability, a programme was conducted to investigate the relative importance of all the factors in high strength concrete mixes. For the purposes of mix design, the results were organised as follows. First the required strength at any age from one day to three months was used to find a reference number from charts provided. Then, in further charts, the water/cement ratio was found from the reference number. Finally, recourse to tables of water/cement ratio, aggregate/cement ratio and Compacting Factor, on the lines of Road Note No.4, (3), enable the aggregate/cement ratio to be found. The percentages of sand are 30 and 45 for coarse aggregates of maximum size 3/8 inches and 3/4 inches respectively and the grading is to comply in each case with No.1 of McIntosh's gradings, (43). It follows that the method is somewhat dominated by compliance to fixed gradings. Further a designer has to rely on the reference number system and these numbers do not necessarily apply to the aggregate he proposes to use, even though the work was done with natural sand as the fine aggregate, in contrast to the mixes investigated by McIntosh.

The method of Popovics also falls into this category, (47,48,49,50,51). It consists of three relationships. The first connects cement content, fineness modulus and the specific gravity of the combined aggregates, aggregate/cement ratio by weight and the percentage by volume of air voids in the finished concrete. The second connects the water/cement ratio, the fineness modulus of the combined aggregates and the cement content. It contains constants which vary with the consistencies, plastic and stiff. The third relates slumps before and after adjustment to a thinning factor by which the unit water content before adjustment is multiplied to get the unit water content needed after adjustment. The concept of thinning factors is extended to other methods of measuring workability. The examination of this method, given later, shows that there are some unusual conclusions to be drawn about it: the optimum fineness modulus of combined aggregates proves to be 6; the thinning factors for adjustments to or from slumps approaching zero are inconsistent with normal findings; the paste contents appear to be higher than in most other methods; there is hidden in the first two equations, which appear to be empirical, a very close relationship with the unit water content theory. The work appears to be related to gravel and sand and the question of shape and packing is not fully covered, but the range of maximum sizes is given as 1 inch to 2-1/2 inches.

(g) The Writer's Method

The writer proposes a method differing from all those mentioned. So far as he has been able to find, by considerable reading of the literature on mix design, it has never been suggested before. It comprises a simultaneous correction for both workability and mortar conditions. The former is changed by altering the aggregate/cement ratio and the latter by alteration of the sand/stone ratio, taking account of the effects of the change of aggregate/cement ratio upon the mortar conditions as modifying any adjustment of the latter required by faults, such as excess or deficiency of mortar in the mix needing correction. Both alterations are made on a basis of weights. It becomes necessary, therefore, to explain why he proposes yet another way of mix design, how it operates, what justifies it theoretically, what evidence there is for and against it, in the more important methods currently in use and what are the results it has given over the years of its trial.

In considering what he asked of a mix design method the writer was influenced by two circumstances, that he was practising as a concrete consultant and that he taught concrete technology. He had found South African conditions militating, in very many cases, against the direct use of the normal European mix methods he knew, and in these instances had been forced to arrive at the solutions by ad hoc processes based on trial, error and judgment. Yet he wished to give his students, whose experience was generally very limited, a way out of the difficulty should they try some accepted method and find that the concrete they so designed was not what they had expected.

Thus the writer set down what he considered to be a number of desirable features, some of general applicability and some peculiar to the circumstances. They were as follows.

(a) That the method should be simple. In this concept was embraced simplicity of operation, of calculation and of memory work.

(b) That it should be quick. This feature was regarded as essential where field application was concerned. To hold up the progress of constructional work because the adjustment of a defective mix takes more than a few minutes is bad for the reputation of the engineer concerned. At his first modification he should demonstrate marked improvement and his second modification should provide very nearly the right answer. For this reason the writer has concentrated very much upon rapid convergence towards the desired qualities of mix.

to solve and the writer's method gives a definite answer without too long or complicated a procedure.

(g) That it should help one to deduce a good approximation to a new mix when conditions change. This may occur when different parts of a structure involve a change in strength or cause a change in the maximum size of aggregate which one may use. It is a distinct advantage to be able to make a fairly close prediction of what will be a suitable new mix under the changed circumstances from a knowledge of the present successful mix.

The writer claims to have met, in his mix method, all the demands itemised above. He acknowledges that the method is based upon approximations but submits that these are in the nature of successive approximations converging upon a desired result. This is the reason he has called it 'mix design by convergence'. He found that there was a pattern to his earlier ad hoc adjustment of mixes. Within the terms of reference of this thesis, there were two kinds of fault in defective mixes, the workability was wrong and/or the mortar conditions were wrong. He found that changing the mix to correct the former altered the mortar conditions for one or both of two reasons, that the correction of the workability influenced the packing of the coarse aggregate and that an increase of aggregate content without changing the ratio of fine aggregate to coarse aggregate changed the amount of mortar in relation to the voids in coarse aggregate it was to occupy. It seemed to him important that the mortar conditions should be under control, for an excessive amount of unwanted mortar is objectionable and a deficiency of mortar is dangerous as far as strength is concerned. Therefore he separated the problem into the two aspects of a primary adjustment for correcting workability and a secondary adjustment for mortar conditions, knowing that these aspects were, in fact, not independent but seeking to find the means of dealing with each separately while finding out how much each affected the other. This was so that he might reach his real aim of a combined adjustment aimed at remedying both kinds of fault simultaneously. Manifestly the starting point was the faulty mix, no matter what its origin.

The difference between its workability and that desired could be found without difficulty by measuring the slump or the compacting factor. Of these, the writer has a preference for the latter but, since the slump is more generally used in South Africa and is the measure common in American practice, he records both where possible and the wigmore number as well. Unfortunately, many of his adjustments on the site were made without recourse to any of these measurements and the records are useless for the present purpose. The measurement of mortar condition is more difficult. The real excess of mortar, or deficiency of it, can be expressed as a fraction of the total concrete volume under prescribed conditions of compaction e.g. in the wigmore container, after having subjected the concrete to a number of jolts equal to the wigmore number for the concrete, or in a large cylinder after having vibrated the concrete by electric hammer or on a vibrating table. These are what the writer uses to estimate what will occur on the site for either hand ramming or vibrating, but he is aware that they are open to doubt pending observation at the site of the actual process of compaction by the equipment in use there. Until this has been done he allows for mortar excesses higher than are likely to be needed, so that the danger of honeycombing is minimised.

So far, a general idea has been offered of why the method has been proposed and how it operates. Consideration in detail is postponed until the end of the examinations of other methods of mix design which follow. Their purpose is to see what weight is given by different authorities to the effects on workability of the parameters in mixes, such as water/cement ratio, aggregate/cement ratio, sand/stone ratio, grading of aggregate, shape of aggregate and packing of aggregate. The writer wishes to identify points of agreement and disagreement between methods and to seek explanations of why his own technique succeeds, despite its lack of sophistication, in satisfying such stringent conditions as he set down.

BASIC EQUATIONS AND THE RELATIONS DERIVED FROM THEM

The symbols used in this section have been listed in the preceding pages and have the meanings assigned to them there.

(i) Absolute Volume Equation. Contents in Terms of Weight Ratios.

The sum of the "absolute" volumes contributed by the constituents, i.e. the sum of the yields of the constituents, towards unit volume of voidless concrete is unity. Therefore:

w/density of water + c/density of cement

+ a/density of combined aggregate = 1

If the air voids in the concrete are to be considered the total yield is (1 + volume of air voids). The writer prefers to calculate on a basis of voidless concrete and correct the total yield afterwards according to the percentage of voids expected, which is related mainly to the maximum size of aggregate in the absence of deliberate air-entrainment. He uses the Bureau of Reclamation values for this correction, which is necessarily approximate, (17).

In the foot - pound - second system of units, and with the introduction of specific gravities, a more useful form emerges:

$$w/62.4 + c/62.4g_c + a/62.4g_a = 1 \text{ cubic foot}$$

.... Equation 1

Dividing by c one gets

$$w/c + 1/g_c + a/cg_a = 62.4/c$$

but (a) pounds per cubic foot = (a/c) / (1/c)

therefore $(a) = (62.4\ a/c)/(w/c + 1/g_c + a/cg_a)$

pounds per cubic foot

.... Equation 2

This, therefore, is an equation for the bulk density of the aggregate in the compacted mix, expressed in pounds per cubic foot; its alternative use is in calculating the aggregate content by weight in unit volume of voidless concrete given the required specific gravities, the aggregate/cement ratio and the water/cement ratio.

Alternatively dividing equation 1 by w:-

$$c = 62.4/(w/c + 1/g_c + a/cg_a) \text{ pounds per cubic foot}$$

.... Equation 3

This gives the cement content per cubic foot of voidless concrete in terms of the same variables as equation 2.

These relations are commonly, and loosely, called absolute volume relationships, but the definition of yield implies that inaccessible voids in the aggregate have been counted in with the volume of the aggregate when determining g_a, so that this is not absolute specific gravity as a physicist would define it. Equations 1,2 and 3 and variations of them are used extensively, (17,19,20,21,25,32,44,50,58).

(ii) Voidless Mixes Containing Equal Weights of Cement

A form the writer finds more useful for mix calculations in practice is based upon a constant quantity of cement in each mix, e.g. 94 pounds, the South African pocket or American sack, of cement. One has now:-

$$W/62.4 + C/62.4g_c + A/62.4g_a = Y \text{ cubic feet}$$

.... Equation 4

In the present work, the values of 195 pounds per cubic foot as the density of cement, and 168 pounds per cubic foot as the density of combined aggregate, have been used. This was the uniform basis to which all other mixes containing constituents of various densities have been referred so that comparisons could be made. The values were chosen as being representative of common South African conditions, with sand densities of about 165 pounds per cubic foot and stone densities of about 169 pounds per cubic foot occurring often.

The equation thus simplifies to:-

$$W/62.4 + C/195 + A/168 = Y \text{ cubic feet}$$

.... Equation 5

Alternatively if the aggregates are considered separately one gets:-

$$W/62.4 + C/195 + S/165 + L/169 = Y \text{ cubic feet}$$

.... Equation 6

(iii) The Relation of U, A/C and W/C

The value of the unit water content in pounds per cubic yard is used extensively in American practice. (20) Firstly, when similar aggregates are used in mixes of different water/cement ratios it is assumed that constant unit water content will ensure the same slump. Secondly, when similar aggregates are used in mixes having the same water/cement ratio but different slumps, then it is assumed that a change of 3% in the unit water content will alter the slump one inch in the same direction, (19,20,21). Dealing for the moment only with the first use, from the definition of unit water content in voidless mixes one has:-

$$U = 27W/Y \text{ pounds per cubic yard}$$

$$\text{or } Y = 27W/U \text{ cubic feet}$$

.... Equation 7

Thus

$$W/62.4 + C/62.4g_c + A/62.4g_a = 27W/U$$

and

$$W/C + 1/g_c + A/Cg_a = 62.4(27W/UC)$$

.... Equation 8

whence

$$A/C = g_a \left(\frac{1685W}{UC} - \frac{W}{C} - \frac{1}{g_c} \right)$$

.... Equation 9

showing that for mixes of equal unit water content, the graph of A/C against W/C is a straight line. When W/C is zero, $A/C = g_a/g_c$. The slope is $g_a(1685 - U)/U$. This graph may be used to distinguish between mix methods in which constant unit water content is fundamental or in which it is not. For example, it is not obvious that mixes designed on Popovics' formulae conform to constant unit water content principles; the graph of figure 170 shows that conformity.

Another use of the graph, provided a fan of lines for different values of U has been drawn, is to estimate the change in aggregate/cement ratio associated with a change in the unit water content. This applies to any set of mixes in which the same sand and stone are used, particularly changes at constant water/cement ratio, described above as being the second use of unit water content methods in American practice.

Thus

$$Y_2 - Y_1 = 27W_1\left(\frac{1}{U_1(1 + 0.03DSL)} - \frac{1}{U_1}\right)$$

$$= -0.03Y_1.DSL \text{ approximately}$$

.... Equation 15

But, again because $W_1 = W_2$ and $C_1 = C_2$, the change in total yield must be caused solely by change in the aggregate yield.

Therefore

$$(A_2 - A_1)/62.4g_a = -0.03Y_1.DSL$$

.... Equation 16

The writer's method of mix adjustment is based upon the change of aggregate weight as a fraction of the aggregate present in the mix before adjustment, viz $(A_2 - A_1)/A_1$ or DA/A_1.

Here

$$DA/A_1 = -(0.03Y_1.DSL)(62.4g_a)/A_1$$

.... Equation 17

Suppose the slump change DSL is made equal to one inch DA/A_1/one inch change in slump $= -(0.03Y_1)(62.4g_a)/A_1$ and from the absolute volume relationships for one cubic foot of voidless concrete, the proportion of the cubic foot provided by A_1 is $A_1/62.4g_aY_1$, or V_A in brief.

Thus

$$DA/A/\text{one inch change in slump} = -0.03/V_A.$$

.... Equation 18

The fraction of the original value A of the aggregate per pocket which has to be deducted as an adjustment is $-0.03/V_A$ of A for each inch change of slump required subject to the approximation made in reaching equation 15 that $0.03DSL/(1 + 0.03DSL)$ was equal to 0.03DSL. This approximation does not affect the issue greatly. When DSL is small the error is small; when DSL is large, whatever error is attributable to the approximation is overwhelmed by grosser errors arising from the change in the behaviour of the mix, because the paste to aggregate relation is subject also to a large change. The adjustment of aggregate content through variation of the unit water content is performed in American practice (except in Popovics' method) without a change of grading.

Suppose that at this stage a return is made to the more general case where DSL is not given the specific value of one inch, with a view to looking for some relation between workability and aggregate weight per pocket or aggregate/cement ratio by weight.

(iv) Absolute Volume Equations. Contents in terms of Volume Relations

If V_W, V_C and V_A are written for w/62.4, c/62.4g_c and a/62.4g_a respectively in equation 1, then:

$$V_W + V_C + V_A = 1$$

and

$$V_W/V_C + 1 + V_A/V_C = 1/V_C$$

whence

$$V_A = (V_A/V_C)/(V_W/V_C + 1 + V_A/V_C)$$

.... Equation 10

and similarly

$$V_C = 1/(V_W/V_C + 1 + V_A/V_C)$$

.... Equation 11

Hughes' expression, (38), is a variant of this; he says,

$$V_C = (V_C/V_W)/(1 + V_C/V_W + V_C V_A/V_C V_W)$$

.... Equation 11a

(v) Constant W/C, Varying U and Aggregate Content

The second use of unit water content, noted above, leads to the equation
para 1, p 30

$$DU/U = 0.03\ DSL$$ .... Equation 12

where DU stands for a change in unit water content and DSL stands for a change in slump. Considering the constituents and yields as before, let the suffixes 1 and 2 distinguish between quantities before and after adjustment increasing the slump.

$$U_2 = U_1 + 0.03\ U_1.DSL$$

.... Equation 13

$$Y_2 = \frac{27W_2}{U_2} = \frac{27W_1}{U_1\ (1 + 0.03DSL)}$$

.... Equation 14

since $W_1 = W_2$ if the water/cement ratio is not changed.

Thus

$$Y_2 - Y_1 = 27W_1\left(\frac{1}{U_1(1 + 0.03DSL)} - \frac{1}{U_1}\right)$$

$$= -0.03Y_1.DSL \text{ approximately}$$

.... Equation 15

But, again because $W_1 = W_2$ and $C_1 = C_2$, the change in total yield must be caused solely by change in the aggregate yield.

Therefore

$$(A_2 - A_1)/62.4g_a = -0.03Y_1.DSL$$

.... Equation 16

The writer's method of mix adjustment is based upon the change of aggregate weight as a fraction of the aggregate present in the mix before adjustment, viz $(A_2 - A_1)/A_1$ or DA/A_1.

Here

$$DA/A_1 = -(0.03Y_1.DSL)(62.4g_a)/A_1$$

.... Equation 17

Suppose the slump change DSL is made equal to one inch DA/A_1/one inch change in slump = $-(0.03Y_1)(62.4g_a)/A_1$ and from the absolute volume relationships for one cubic foot of voidless concrete, the proportion of the cubic foot provided by A_1 is $A_1/62.4g_aY_1$, or V_A in brief.

Thus

$$DA/A/\text{one inch change in slump} = -0.03/V_A.$$

.... Equation 18

The fraction of the original value A of the aggregate per pocket which has to be deducted as an adjustment is $-0.03/V_A$ of A for each inch change of slump required subject to the approximation made in reaching equation 15 that $0.03DSL/(1 + 0.03DSL)$ was equal to $0.03DSL$. This approximation does not affect the issue greatly. When DSL is small the error is small; when DSL is large, whatever error is attributable to the approximation is overwhelmed by grosser errors arising from the change in the behaviour of the mix, because the paste to aggregate relation is subject also to a large change. The adjustment of aggregate content through variation of the unit water content is performed in American practice (except in Popovics' method) without a change of grading.

Suppose that at this stage a return is made to the more general case where DSL is not given the specific value of one inch, with a view to looking for some relation between workability and aggregate weight per pocket or aggregate/cement ratio by weight.

$$DA/A = -0.03DSL/V_A$$

or $$D(A/C)/A/C = -0.03DSL/V_A$$

$$DSL/D(A/C) = -(0.03A/C)/V_A$$

but from equation 10:-

$$V_A = (V_A/V_C)/(V_W/V_C + 1 + V_A/V_C)$$
$$= (Ag_c/Cg_a)/(Wg_c/C + 1 + Ag_c/Cg_a)$$

Therefore

$$DSL/D(A/C) = -(0.03A/C)(Wg_c/C+1+Ag_c/Cg_a)/(Ag_c/Cg_a)$$

in which g_a, g_c and W/C are constants for the conditions under review.

So, integrating;

$$SL = -33.3 \log_e(A/C + \text{a constant}).$$

.... Equation 18a

This leads one to consider the possibility that the curve of slump against aggregate/cement ratio approximates to the form

$$SL = -K_1 \log_e (A/C) + K_2$$ see Fig 17b

in which the constant K_1 affects the steepness of the curve and K_2 its lateral position. The investigation of the A.C.I. mixes, given later, shows that this approximation holds true sufficiently well over a wide range of mixes to provide an acceptable and more convenient practical substitute for the normal procedure in adjustment by the 3% rule of the American Concrete Institute, the Portland Cement Association and the Bureau of Reclamation. This convenience is enhanced if the adjustment of mortar conditions is to be undertaken simultaneously.

(vi) Mortar Conditions. Apparent Mortar Excess. Real Mortar Excess.

Let it be assumed that a concrete mix, No.1, has been made in which the water/cement ratio is deemed satisfactory and there is neither mortar excess nor mortar deficiency observed when the concrete has been placed, i.e. the real mortar excess is zero or there is balance between the quantity of mortar provided and the voids in the stone available to accommodate it under the conditions of placing. Suppose that the workability of this mix is too high, so that an economy of cement can be effected. The correction is to be made in a second mix, No.2, having the same water/cement ratio, and it is stipulated that the mortar must be in balance again.

Let the difference between the yield of mortar and the volume of voids in the dry coarse aggregate before it is in the mix be called the apparent mortar excess, AME.

In mix No.1, for unit volume of voidless concrete:

$$AME_1 = V_{W1} + V_{C1} + V_{S1} - kV_{L1}$$
$$= 1 - V_{L1} - kV_{L1} \qquad \text{.......... Equation 19}$$

where k is the ratio of voids to solids in the dry stone. Figure 2 illustrates the situation. The AME shows how much extra void space in the stone has been created by introducing the mortar to the existing volume of voids, kV_{L1}, in the dry stone.

If an absolute volume V_{L2} of stone is used in the second mix, the required AME_2 should be

$$(V_{L2} \times AME_1) / V_{L1}$$

Equating these two values of AME_2:

$$1 - V_{L2} - kV_{L2} = V_{L2}(1 - V_{L1} - kV_{L1}) / V_{L1}$$

$$\text{.......... Equation 20}$$

whence $V_{L2} = V_{L1}$.

The argument has been given for a concrete that is in balance as far as mortar conditions are concerned. It is equally true if a real mortar excess, RME_1, is observed in the first mix and is to hold in the second mix, so that $RME_1 = RME_2$ because now:

$$1 - V_{L2} - kV_{L2} - RME_2$$
$$= V_{L2} (1 - V_{L1} - kV_{L1} - RME_1) / V_{L1}$$

$$\text{........... Equation 21}$$

and again $V_{L2} = V_{L1}$.

In the case considered, the unit water contents of the two mixes are different. The second may be calculated from the first by the application of some technique of adjustment such as the 3% rule of A.C.I., or any alternative way that is considered effective. The water/cement ratio now controls the amount of cement. The remaining yield in unit volume must be furnished by fine aggregate and therefore the whole of the mix proportions can be computed.

Insistence upon retaining, at least in theory, similar mortar conditions in the second mix has been shown to be associated with constant unit stone content even though the unit water content has been changed. The paste content and the sand content both change too, but the mortar content remains the same to fill the same quantity of stone voids, provided there is no alteration in the packing. This cannot be guaranteed, because both the workability and the constitution of the mortar affect this and some correction for the changed condition of packing will be needed. The extent of the correction is indicated by the error observed in the real mortar excess, which it was intended to reproduce. In the event that less paste is provided, the packing will generally be less satisfactory and somewhat more mortar and less stone has to be used. Should more paste be provided, the opposite will hold unless the thinning of the paste has led to harshness.

There is a distinction between the error just described and the error caused by changing the aggregate/cement ratio to satisfy the requirements of a new unit water content but retaining the same percentage of sand in the combined aggregate. The mortar content and the stone content no longer maintain the same relation with this kind of adjustment. Reduction of the mortar and increased provision of stone voids, or the converse, occur at the same time, exaggerating the effect upon real mortar excess. Yet this is the way of adjustment most commonly used. The concept of constant stone factor, so dominant in American methods, (19,20,21), is applied in somewhat different circumstances - that the unit water content and the unit stone content remain the same, while the water/cement ratio changes. In effect mixes of the same workability and the same real mortar excess are produced for a range of different water/cement ratios by the exchange of sand for cement or vice versa. The same technique is given by Hughes, (38), as fundamental to his method.

(vii) <u>The Writer's Workability Function</u>

The discussion so far has indicated that the adjustment of workability, at the same water/cement ratio, requires an alteration of the aggregate/cement ratio. If this is done by changing the unit water content, the process requires determination of the changed paste content and hence the new aggregate content can be found. Alternatively the writer's graph of A/C against W/C upon which sufficient lines of constant unit water content have been drawn will give a graphical solution for the new aggregate/cement ratio. It is now a matter of choice whether the subdivision of the combined aggregate into proportions of sand and stone is done by constant stone content or constant percentage of sand. Either way, some error of the mortar condition must be expected and the former is likely to cause less error, but requires more calculation.

Suppose, instead, that the unit water content method is not to be used, but that the aggregate/cement ratio is to be altered in accordance with values estimated from tables. Unless the aggregates available are of the same nature as those for which the tables were constructed, the probability of finding the revised mix acceptable in both workability and mortar conditions is low.

Therefore, to solve the problem the writer proposes to change workability another way. He thinks that the simplest way is to change the aggregate/cement ratio in the first mix by a fraction of itself multiplied by the magnitude of the change in workability desired. Aggregate is increased to reduce workability and decreased to increase workability. He suggests a change in the aggregate/cement ratio of (1/15) times the aggregate/cement ratio in the mix to be adjusted for every inch of slump change, or of (1/40) times the aggregate/cement ratio in the mix to be adjusted for every 0.01 change in compacting factor. wanted. His reason for preferring to do mix calculations on a basis of one pocket mixes becomes apparent, for the alteration in the weight or volume of aggregate per pocket is calculated on a basis of 1/15 per inch of slump change or 1/40 per 0.01 change in compacting factor. This is the broad suggestion in relation to the primary adjustment for workability. No claim is made that it is precise but it will be seen in the subsequent examinations of other methods of mix design that this technique finds considerable justification. The disagreement between the mix composition by different methods of design for what appear to be the same aggregates is quite large so that it is evident that no one can hope for precise solutions amid so many intangibles. However, the writer shows that there is a measure of agreement among the methods - that the change of aggregate per pocket to secure unit change of workability falls within a narrow range for the very large majority of over 5000 mixes investigated - regardless of differences of opinion upon what composition should be used and the range of such compositions with various strengths and types of aggregate.

If, then, it is accepted that this mode of adjustment is feasible, judged upon comparison with other mix methods, all but one of which alter the aggregate/cement ratio, but hold the percentage of fine aggregate constant, a workability function can be postulated.

Consider that D(A/C) is the change in A/C required to give DSL change in slump and that A/K_1 will give one inch change in slump.

Then:

$$DA = -(A.DSL)/K_1 \qquad \text{.......... Equation 22}$$

$$DSL/DA = -\frac{K_1}{A} \qquad \text{.......... Equation 23}$$

$$SL = -K_1 \log_e A + K_2 \qquad \text{.......... Equation 24}$$

K_1 appears to be about 20 to 25 from the analyses given later. K_2 is the control of the lateral position of the curve and can be given any suitable and convenient value. Thus a curve of A/C against slump can have sufficient portions of this curve set out at different vertical levels to enable an immediate estimate of the new aggregate/cement ratio to be found from the old value by following along the line of the curve from the old slump value to the required slump. Figure 175 is such a diagram.

The discrepancy between the writer's suggestion of $K_1 = 15$ and the illustration where $K_1 = 20$ or $K_1 = 25$ is caused by two influences. In the absence of a chart like figure 175 the adjustments are made in discrete steps. They compare more closely with a tangent or chord than with a curved path. The second reason is that the writer does not propose to do the primary adjustment alone but to superimpose a secondary adjustment, involving a change in the percentage of sand. His selection of A/15 per inch of slump change is therefore the result of experience in the composite adjustment. Moreover, there is no need to be dogmatic about setting K_1 at 15; if it makes the arithmetic easier, 16 can be used. This is a method intended to converge upon the desired result. If small changes are wanted, it makes little difference whether 15 or 16 is employed. If large changes are wanted, it is only very good luck that will secure a closure with the first adjustment, and, if not, the selection of 15 or 16 is again a matter of little moment, for the next adjustment will be small. The main object is to get the answer with very few trials and to accept philosophically the obstruction afforded by the difficulties of interpreting workability observations and the unexpected effects which can result from the interactio of the paste, mortar and stone, as adjustments are made

The same types of curve relating A/C and compacting factor are shown in figure 176, drawn with K_1 as 0.5 and 0.6, for the analyses show that A/50 or A/60 is the change in aggregate per pocket for a change of .01 in the compacting factor and hence the workability function has the equation $CF = - K_1 \log_e A + K_2$ as before but K_1 now takes the value 50/100 to 60/100. Again the writer uses a higher adjustment than indicated by the analysis and for the same reasons.

There are circumstances where the writer does use the values which have come from the analyses. He found by experience that with aggregates of maximum size greater than 2 inches his adjustments were too great and reduced them. There is also a tendency at high aggregate/cement ratios to get overadjustment. With these mixes, however, the whole problem is affected by harshness due to watery pastes and more trials are needed than for average or strong mixes. Even so the writer submits that it is preferable to proceed systematically and quickly, making each trial mix notably better than its predecessor on a basis of observations at each stage, than to seek some law of universal application which requires lengthy calculations and aggregate testing to reach the same objective.

(viii) <u>The Adjustment of Real Mortar Excess.</u>

<u>Theoretical Mortar Excess</u>

It appears inevitable that there will be errors in mortar conditions, as measured by real mortar excess, in the first trial mix or in the mix developed from this by applying the primary adjustment for workability

A method of adjustment to correct such errors, if possible, or to minimise them if it is not possible, is needed as a secondary adjustment. It has to be simple as was the first adjustment and of the same nature so that the calculations for both can be done at the same time and the combined adjustment applied to the first trial mix or any subsequent mix.

The secondary adjustment differs from the primary one in that it is no longer a matter of changing aggregate/cement ratio but of keeping this constant and adjusting the mortar to voids relation by exchanging sand for stone, or vice versa, in a cement paste of the same volume and viscosity in each case.

In unit volume, the mortar equals (1 - volume of stone) and the voids are (constant x volume of stone). Therefore the secondary adjustment is best referred in the first place to stone volume, not to the whole unit of volume. The change in stone content for unit change in the real mortar excess is sought. Following the pattern used in the primary adjustment, one wishes to change the stone content by some fraction of its existing value for each unit of change required in the observed real mortar excess to bring it to what is desired. To explain how he believes that this can be done, the writer wishes to introduce the idea of theoretical mortar excess, TME which is merely a tool for evading the trial and error calculations which would be necessary without its intervention. It is defined, in unit volume of finished voidless concrete, as the mortar volume minus the volume of voids in dry stone, both divided by the volume of voids in dry stone

$$TME = (1 - V_L - kV_L)/kV_L = (AME + RME)/kV_L$$

Thus if D(RME) is the change in RME caused by a change D(TME) then:

$$D(RME) = kV_L . D(TME) \quad .... \quad \text{Equation 25}$$

Using suffixes 1 and 2 for the quantities in two mixes before and after adjustment:

$$TME_1 = (1 - V_{L1} - kV_{L1}) / kV_{L1}$$

$$= 1/kV_{L1} - 1/k - 1$$

$$TME_2 = 1/kV_{L2} - 1/k - 1$$

$$= 1/(kV_{L1} + D(kV_{L1})) - 1/k - 1$$

$$TME_2 - TME_1 = -D(V_{L1})/k(V_{L1})(V_{L1} + DV_{L1})$$

$$.......... \quad \text{Equation 26}$$

In general terms:

$$D(TME) = - D(V_L)/k(V_L)(V_L + DV_L)$$

$$........... \quad \text{Equation 27}$$

which for small changes becomes

$$kV_L.D(TME) = -D(V_L) / V_L = -DL/L$$

Thus

$$D(RME) = -DL/L, \quad .... \quad \text{Equation 28}$$

or, for 0.01 increase wanted in real mortar excess, the decrease in the stone is one hundredth of the stone content, and the converse, subject to the approximation made before equation 28

When the method is applied in practice the value of 0.01 for DL/L/0.01 change in RME is found to be higher than is desirable, because other effects from the change in aggregate/cement and paste content are encountered at the same time. Just as the theoretical value for DA/A/change in workability needed modification the theoretical value for DL/L/change in mortar conditions warrants reduction for fear of over-correction of the faults. The writer finds that 1/250 in lieu of 1/100 prevents this. In any event, corrections involving the exchange of less than 5 pounds of sand or stone per pocket can be regarded as too small, since variations in aggregate and errors in batching cause fluctuations in concrete properties equivalent to $\pm$ 3 pounds change in the sand or the stone per pocket. Therefore the modification suggested has not so drastic an effect as might appear; over the general run of stone contents the modification makes one or two pounds difference per 0.01 change in real mortar excess, and if large changes of the latter are involved, the adjustment has to be regarded as approximate because of the uncertainty about how the packing of the stone will affect the issue. It will be seen that an assumption has been made that apparent mortar excess is not changed by the operation. This will be true enough for small adjustments but cannot be relied upon in large adjustments.

As a whole, the composite method proposed by the writer must appear to be riddled with approximations. They do not affect the validity of the technique, for its success depends upon successive approximations towards the desired goal in any case. It has been shown that such approximations could be expunged from the system, but this would rob it of its simplicity in practice, and it is suggested that this simplicity is more valuable than the dubious accuracy which might be obtained by more complex calculations of the quantities for adjustment.

There is a further use possible for the TME values, recorded in the tables of one pocket mixes in Appendix 2. The values have been calculated for k = 0.5. If it is accepted that, in any series of mixes calculated from a particular mix method, the real mortar excess is unlikely to vary much, then the means are available to make preliminary estimates of the AME for sundry combinations of sand and stone. From this, predictions of the extra mortar required beyond the volume of voids in the dry stone are possible. The writer did consider this approach to mortar conditions but rejected it as too cumbersome and open to question.

THE EXAMINATION OF PARTICULAR MIX METHODS

Some of the mix methods which the writer has studied are examined in the following sections. In each case, the object of the examination has been to bring the different ways of presenting the information, within the various methods, to a common basis so that the results can be compared or contrasted. To maintain as consistent a presentation, as the differences between methods will allow, it was decided to subdivide each examination into the following parts.

(i) A resumé of the information to be acquired about the aggregates as a prerequisite for design by the method.

(ii) A note upon any equations forming part of the method.

(iii) An outline of procedure in design or adjustment.

(iv) The results of the writer's numerical analysis of mixes so designed or adjusted.

(v) Graphical representation, where necessary, of the results.

(vi) Discussion of the conclusions drawn from the examination of the method.

For the purposes of part (iv), the writer has organised a system of analysis consisting of three stages and the order of doing the first two depends on the way in which the basic values are presented in the mix method under consideration. One stage is to express all the mixes by weight so that they contain the same quantity of cement, no matter what variations of water, fine aggregate or coarse aggregate may occur; 94 pounds is the weight of cement chosen to be common to the mixes, and thus the term 'one pocket mixes' is used in the computed tables. Within this same stage of analysis, the tables are extended to give additional information about the one pocket mixes, most of which is derived from applications of the fundamental equations for voidless concretes (equation 1 to 7) because the writer prefers this as a basis for comparison, in preference to conditions in practice where the concrete has varying voids content. The items comprise the total weights in pounds of the mix parts, the yields of individual constituents and the yield per pocket in cubic feet, the density of the concrete in pounds per cubic foot and the proportion of unit yield contributed by each of the four materials. The writer's theoretical mortar excess - based here somewhat artifically upon an assumption of about 50% of voids in the dry coarse aggregate - the unit water content in pounds per cubic yard, the proportions by weight and volume of sand in combined aggregate and a number for identifying the mixes and the tables obtained by this stage of the analysis. In making the calculations for the items listed above, the values of the density of water, of cement, of fine aggregate and of coarse aggregate have been assumed to be 62.4, 195, 165 and 169 pounds per cubic foot respectively.

Another stage in the analysis is the formation of tables of water/cement ratio and aggregate/cement ratio for the same mixes as above.

The third stage is to find what change in aggregate content per pocket there is between two mixes of the same water/cement ratio as the workability alters and to express this change as a proportion of the original aggregate for either 1 inch change in slump or 0.01 change in the compacting factor. This stage of the analysis is to look for evidence for and against the writer's proposals on mix adjustment. In some mix methods, this stage is not possible because all the mixes tabulated are intended to be of the same nominal workability.

The graphical work of part (v) has been approached as follows. In order to trace the relation between the constitution in terms of water, cement and aggregate and such characteristics of the mixes as maximum size of aggregate, fineness modulus of the sand, or similar quantities intrinsic to a mix method, the writer has used the triangular diagram of mix parts by absolute volume, figure 1. He has described the properties of such a diagram elsewhere (39) and has marked on figure 1 some isonomes of water/cement ratio and aggregate/cement ratio. Then, another form of diagram, to differentiate between the mix parts by volume, at particular water/cement ratios, emerging from the analysis of different mix methods, has been employed. This is a rectangular diagram to a base of water/cement ratio by weight; the ordinates are the cumulative yields of the constituents in unit volume of concrete. This permits a survey of the paste to aggregate relation of the fine aggregate to total aggregate relation and of the apparent excess of mortar over stone voids, all of these relations being in terms of absolute volumes. The apparent excess of mortar over stone voids per unit volume of concrete can be illustrated graphically. Figure 2 shows an example. Suppose the dry coarse aggregate has 40% of voids by volume, it follows that an ordinate representing this can be drawn on a rectangular diagram 40%/60% of the length of the ordinate representing the absolute volume of solid coarse aggregate. If the two ordinates are drawn in opposite directions from the upper and lower datum lines, the interval between them represents the excess of mortar volume over the voids or, if the lines should overlap, a deficiency of mortar. This is the apparent condition only, for it represents the situation when the stone voids in the concrete are the same as were found when the aggregate was alone and in a dry state. The difference between the value of apparent mortar excess, AME, so found, and the real mortar excess RME, observed in the concrete mix when compacted into place, is a measure therefore of the extent to which the paste and sand have interfered with the voids condition of the stone, as determined before it was mixed with mortar. It will be seen that the writer uses a slightly different concept when he refers to theoretical mortar excess, TME, in connection with his method of adjustment of mortar conditions.

The plotting of aggregate/cement ratio against water/cement ratio is used in connection with equation 9, chiefly as a means of showing conformity with the concept of constant unit water content, which dominates American practice, or the degree of non-conformity.

In some instances, the results from the third stage of analysis have been cast into the form of histograms, partly to show the spread and partly to show whether there is skew or not. The analysis has not been extended beyond finding arithmetic means in any of the cases, since it was considered that calculating the standard deviation or fitting curves to the histograms would rarely be of benefit.

Other forms of plotting relationships will be found in connection with the discussions upon the writer's suggestions about adjustment; for example, graphs of aggregate/cement ratio against workability. These are, in general, extensions of his normal procedure in the examination of particular mix methods.

C P 114 Standard Mixes

A grading analysis of the aggregates is required to show that they comply with B.S.S.882 or 1047, prior to their acceptance for use with this method of design, (7).

Then, entering the table with one of three strengths, one of three workabilities and one of four maximum sizes of stone, the designer finds the weights of natural sand of Zone 2 and of stone per 112 pounds of cement. The answers have to be corrected for other zones or for a crushed sand.

In the numerical analysis of the contents of the table, and all its corrections, the writer has taken the zones in order 1, 2 and 3, firstly for the natural sand and secondly for the crushed sand. The fineness moduli of the natural sands are 3.35, 2.75 and 2.25 respectively, and for crushed sands 0.05 less in each case, for the average grading in the zone. He has taken the least correction, viz. a reduction of 25 pounds in the aggregate per bag of cement, when making the change from natural sand to crushed sand. Within any zone, the maximum sizes of stone are ranged in order from 3/8 inches to 1½ inches and, within the sizes, the workability rises from low via medium to high, shown as L, M and H on the figures. The resulting sets of either two or three mixes are treated in order of water/cement ratio 0.56, 0.63 and 0.71. These values are the writer's own choice of water/cement ratios to give the strengths specified and are for use in his present purpose of constructing one pocket mix tables, 1 to 4 in Appendix 1, or could be used for trial mixes. In all, the variations provide 198 mixes; it will be noted however that 216 identification numbers have been allocated, because these included the blank squares in the table of C P 114. The purpose was to make it easier to form symmetrical tables of water/cement ratio with aggregate/cement ratio and of proportional change in aggregate content for change of workability, tables 5,6 and 7.

Figure 3 is an explanatory diagram. It shows the points obtained by plotting on the triangular diagram the compositions of mixes containing 3/4 inch maximum size of aggregate and crushed sand at three levels of workability and for three water/cement ratios. It is intended to demonstrate how one may observe the change in the position of the points along lines of constant water/cement ratio as the workability changes or observe the shift of mixes of the same workability with change of water/cement ratio. For his immediate purposes the writer is more interested in the former changes.

Figures 4 and 5 are extensions of the same process and show all the points for natural sand and crushed sand respectively. The method of correction is such that the sand zones have no influence on the positions of the points, for the total aggregate is unaffected by a sand change equal and opposite to the stone change. The overall displacement from the natural sand group to the crushed sand group is not as large as the writer would have expected, but he acknowledges that he has chosen the least correction indicated for this purpose.

The same effect is shown in figures 6 to 13, where the change from natural sand to crushed sand causes very little alteration in the position of comparable mortar lines, irrespective of the maximum size of aggregate, the zone of the sand or the workability.

An examination of the water lines and paste lines shows that their positions, too, are unaffected by sand zone, and little affected by a change from natural to crushed sand. They change with maximum size of aggregate and with workability; the closing together of the sets of three lines of low, medium and high workability as the maximum size of aggregate increases is a side effect of the increasing dominance of aggregate content as the stone size increases.

Changes in the positions of the mortar lines are a little more difficult to trace; they are increased in number because the sand zones and the workabilities both have an effect here, as well as the maximum size of aggregate and character of sand. The pattern is similar to that for water and paste lines in respect of sand of natural origin or crushed sand. As the maximum size of aggregate increases, the closing together of the lines shows again, now due to rises in the proportion of coarse aggregate in total aggregate. Throughout the whole series, the coarser the sand, the higher the proportion of it is used, other characteristics being held constant. One can see also that a change of one level in the workability requires a greater alteration in the composition of the mix than a change of sand to an adjacent zone, but (like others of the general observations above) this ought to be considered more precisely in terms of measurements of workability and of some measure of grading, (although here caution will be needed because the zones are wide) before it can be used to place results from this method in proper relation to the results from another. Nevertheless, the writer has indicated in some detail how he proceeds to dissect the composition diagrams with the object of finding whether the method under review has unusual features. In this instance, nothing remarkable has been found. One does not know until these compositions have been compared with those from another method whether the positions of the plotted points will match in cases intended to give equivalent mixes by that separate method of design. Yet it can be said that the general effects upon composition attributed to the parameters, workability, maximum size of stone, grading and character of sand, operate in the directions to be expected.

Figures 14 and 15 show the effects of plotting aggregate/cement ratio against water/cement ratio for natural and crushed sands respectively. To demonstrate the deviations of C P 114 mixes from the constant unit water content relation of equation 9, certain lines satisfying the equation have been superimposed. It is evident that the deviations are greatest for the 3/8 inch and 1½ inch maximum stone, otherwise they are not notable.

Figures 16 and 17 were constructed from tables 6 and 7. The latter were calculated on the doubtful assumption that the average workability, whether in terms of slump or compacting factor, was the mean of the two limits quoted in any column of the C P 114 table and that the change in workability from one column to the next might be taken as the difference between the relevant means. The histograms for DA/A/1 inch change in slump show very strong right skew with no very great difference showing between natural and crushed sand. The average values of the proportional change in aggregate are 0.146 for natural sand and 0.155 for crushed sand per 1 inch change in slump. The histogram for DA/A/0.01 change in compacting factor are slightly skewed to the right, very much more compact, and again with little difference between natural sand and crushed sand. The average values of the proportional change in aggregate are 0.025 for natural sand and 0.026 for crushed sand per 0.01 change in compacting factor. Wide variations in the values within the table make it improper to give too much weight to the average values quoted. Yet one reasonable conclusion is to be drawn from this stage of the analysis - that the proportional changes for natural and crushed sands are sufficiently similar, throughout, for one to suggest that here is evidence that, whatever schemes of adjustment on this basis are considered, their application ought to operate equally well for both kinds of fine aggregate.

ROAD NOTE NO. 4

The background to Road Note No.4, (3), is Road Research Technical Paper No.5, (2), reporting the results of an investigation upon concretes made from aggregates having four different gradings, for two maximum sizes of stone, 3/4 inch and 1-1/2 inch, and for three classes of shape, rounded, irregular and angular. The shape applies to both the fine and the coarse aggregate in any combination to give one of the gradings specified. Workability was measured by the Compacting Factor Apparatus, newly developed in this investigation.

Road Note No.4 classified the results found into tabulations of water/cement ratio against aggregate/cement ratio for four groups of workability for all gradings and shapes in respect of the aggregate 3/4 inch down, but only for irregular aggregate 1-1/2 inch down. A method was included for combining aggregates to obtain a specified grading, so that the dependence of the method upon conformity with the range of gradings in Road Note No.4 was evident. A technique of interpolation between tabulated values for aggregate all of one shape is included to meet the situation where it is desired to combine angular coarse aggregate with rounded fine aggregate.

The steps in the procedure are therefore:-

(i) Find the gradings of the aggregates it is proposed shall be used.

(ii) Identify their shapes, if in doubt, by comparison with the illustrations of Road Research Technical Paper No.5.

(iii) Examine the relation of aggregate/cement ratio to water/cement ratio to select a grading in which the former is the highest possible for economy, having regard to the chosen water/cement ratio and workability.

(iv) Combine the aggregates in the proportions determined by the graphical solution to this problem.

(v) Prepare a trial mix and adjust the proportion of fine aggregate to coarse aggregate, if the trial shows that conforming strictly with step (iii) is leading to harshness or poor finish. It is presumed that, if the workability does not agree with the aim, the aggregate/cement ratio will be altered towards the values given in adjacent columns or that the cause will lie in excessive amounts of - 3/16 + No.14 material (which will need more cement) or excessive amounts of - No.25 material (which will necessitate an increase of sand up to 10% by weight of the total aggregate).

In his examination of Road Note No.4 mixes, for this thesis, the writer has taken the case where crushed stone is used with a rounded natural sand, because other cases, which he has considered elsewhere, (39), are rarely encountered in South Africa. He proceeded to interpolate on the lines indicated and then smoothed out the values in the resulting tables by the graphical process described by McIntosh, (42). The smoothed values are recorded in table 8 and have been used to form graphs of A/C against W/C, figures 18 to 25; the one pocket mixes and ancillary information were computed and tables 9 to 13 of these lead to the triangular and unit composition diagrams in figures 26 to 33 and 34 to 41. An inspection of the plottings of A/C against W/C shows that the points, for any series where the grading, the maximum size of aggregate and the workability are the same, lie on a curve, not on a straight line. This effect is quite marked in some instances. The conclusion is reached that the Road Note No.4 mixes do not follow the constant unit water content relation. This is confirmed by the triangular diagrams.

The unit composition diagrams show increases in sand content with decreases in fineness modulus of the combined aggregate of a particular maximum size. This is contrary to the usual practice, evidently originating in the transfer, of the fundamental research findings, forward to a mix design procedure. It is noted also that the lowest fineness modulus of sand is 2.58, not reaching down to that of a fine sand.

A further point which emerges is that, when one considers the volume of mortar provided in different mixes and the stone voids by volume in these, which can be done in a general way by making some assumptions about the latter, it is found that large variations occur. In attempting to find the magnitude of variation caused by the alteration of one of the mix parameters i.e. workability, water/cement ratio, grading or maximum size, one observes that, overall, the greatest effect is found with change of grading and the next with water/cement ratio. Change of workability or of maximum size have little effect, save with coarse grading. Thus changes of the arrangement of the voids in the bulk stone by interposing varying quantities of fine aggregate explain much of the variation and changes of paste viscosity explain nearly all the rest, always provided that the real mortar excesses in the mixes were similar, which is a reasonable assumption in an organised table of mix parts constituting a full series for general use. If this is so, the findings above support the theory behind the writer's proposal on mortar adjustment.

Since, for a given water/cement ratio, it is possible to find the aggregate/cement ratios for different compacting factors, in mixes wherein the aggregate shape, grading and maximum size are alike, the values of DA/A/0.01 change in compacting factor for comparison with the writer's suggestion of an empirical value in the neighbourhood of 1/50. This has been done by dividing the ratio of the change in aggregate/cement ratio for either a rise, "up", or a fall, "down", to the aggregate/cement ratio before adjustment by the change in compacting factor in units of 0.01.

$$DA/A/0.01\ CF = \frac{DA/C}{A/C} \times \frac{1}{DCF}$$

This is acknowledged to be a crude method of ascertaining the slope/ordinate function of a curve. However, the mean values for upward and downward adjustments in compacting factor give an approximation quite good enough for the writer's purpose and an inspection of the tabulated results (table 14) and of the histograms (figures 42 to 44) showing the frequency distribution of values of DA/A/0.01 CF indicates that there is such a spread of values as to discourage one from using more refined analysis. The conclusion drawn from the histogram is that the evidence in favour of the writer's suggestion is weak. The average value over the whole field is 0.0206, which agrees very well, but the range is from 0.0056 to 0.0394, i.e. about 1/200 to 1/40, and the frequency curve is strongly skewed to the right. The writer can, however, detect no pattern in the values to show whether his figure should be modified to suit differences between either maximum size, grading or compacting factor at the datum points from which the alteration, DA/A/0.01 change in compacting factor, was measured. DA/A/1 inch change in slump was not examined in this case because the values of slump given in the tables of Road Note No.4 "must be regarded as giving a rough indication of the order of the slump and nothing more".

For the purposes of comparison with other methods, at a later stage, the fineness moduli of the aggregates and estimates of the water demand by the Zietsmann method, (69), described later, are recorded below.

Max. Size	Grading Number	Fineness Modulus of Sand	Fineness Modulus of Combined Aggregate	Water "Demand"
3/4	1	3.33	5.75	346
	2	3.11	5.44	349
	3	2.88	5.04	348
	4	2.58	4.51	351
1-1/2	1	3.34	6.50	327
	2	3.09	6.04	330
	3	2.87	5.56	328
	4	2.63	5.07	331

None of the sands are fine, according to the usual criterion of having a fineness modulus in the neighbourhood of 2.0.

It has been noted already that Road Note No.4 mixes, considered in sets having the same grading, do not follow lines of unit water content when plotted on diagrams of A/C against W/C. Now one sees that, according to the theory of water demand, all sets of mixes having 3/4 inch and 1-1/2 inch maximum size of stone should have a unit water content close to 350 and 330 pounds per cubic yard respectively. The U values in tables 9 to 13 show the extent of the departures from these two estimates. The range for 3/4 inch mixes is from 241 to 392; the range for 1-1/2 inch mixes is from 247 to 407. This goes far towards explaining the major cause of disagreement between adherents of Road Note No.4 mixes and adherents of water demand theory (32).

McINTOSH

The text by McIntosh (43) originates in the research papers by himself and his colleagues in the Cement and Concrete Association. The information to be gathered before designing is the same as for Road Note No.4 method and the procedure is the same. He has used the same grading curves for 3/4 inch maximum stone and for 1-1/2 inch maximum stone as were used there, but has extended the range to cover 3/8 inch maximum coarse aggregate and has included all three shapes of aggregate, rounded, irregular and crushed, for all sizes. The tables for rounded and crushed aggregate of 1-1/2 inch maximum size were found by extrapolation. For gradings that are 3/8 ihch down McIntosh defines mixes of very low, low, medium and high workabilities as having compacting factors 0.75, 0.83, 0.90 and 0.95 respectively, but for the other maximum sizes of stone he uses the Road Note No.4 values of 0.78, 0.85, 0.92 and 0.95 respectively. This difference has been taken into account in the calculations of DA/A/0.01 change in CF.

The writer has confined his attention to the irregular and crushed aggregates only, because rounded coarse aggregate is rare in South Africa. McIntosh suggests interpolation techniques when the coarse and fine aggregates are of different shapes, as does Road Note No. 4, but adds that for "a crushed rock coarse aggregate with low absorption and a natural sand, the values might well be the same as for irregular gravel aggregate". Therefore, although the writer has plotted the primary values of A/C and W/C from McIntosh's tables and the triangular diagrams for both shapes so that the effects of change of shape may be observed, he has drawn the rectangular composition diagrams for irregular gravel aggregate only, with a view to comparing these with the diagrams obtained by interpolating in the tables of Road Note No.4 for crushed coarse aggregate and fine sand, as described in that section.

Tables 15 to 17 list the McIntosh values of A/C and W/C, tables 18 to 32 give the corresponding one pocket mixes and tables 33 to 35 contain the results of calculating DA/A/0.01 change in compacting factor. Figures 45 to 56 illustrate the A/C and W/C relation for both irregular and crushed aggregate of all three sizes and figures 57 to 80 are the triangular diagrams for these mixes. Figures 81 to 92 show the composition of the mixes with irregular aggregate for comparison with figures 34 to 41 of the same functions in Road Note No.4. There is a general likeness between the pairs of equivalent diagrams but evidence that McIntosh uses less paste. The difference is up to about 4% in the case of 3/4 inch maximum stone and up to 15% with 1-1/2 inch maximum stone. The differences must be those of opinion, because gradings, shapes maximum sizes and compacting factors are identical. The figures for 3/8 inch maximum stone cannot be compared with anything in Road Note No.4 but they show the same unusual policy of using more of a finer sand than of a coarser sand with any given coarse aggregate, and show the same feature of departure from lines of constant unit water content, as shown by the superimposing of some of these on figures 45 to 48.

A note of the values of fineness modulus and of the writer's estimate of the water demand, (69), of the 3/8 inch maximum size of aggregate is given below. The values for 3/4 inch and 1-1/2 inch are identical with those of Road Note No.4 and need not be reproduced here.

Max. Size	Grading Number	Fineness Modulus of Sand	Fineness Modulus of Combined Aggregate	Water Demand
3/8	1	3.27	5.18	360
	2	3.07	4.68	355
	3	2.86	4.12	375
	4	2.79	3.59	375

Again one sees that the finest of the sand gradings has a fineness modulus well above the value of about 2.0, which would usually be recognised as a fine sand.

Figures 93 to 95 show the histograms of DA/A/0.01 change in compacting factor for the three sizes - figure 95a illustrates the effect of taking together the values for irregular aggregate of both 3/4 and 1-1/2 inch maximum size of stone as was done for Road Note No.4 in figure 44. The average here is 0.0236, as against 0.0206 for figure 44.

It appears from a detailed analysis of the values in tables 33 to 35 that as the grading becomes finer there is a decrease in DA/A/0.01 change in compacting factor and that the same occurs upon changing from irregular aggregate to crushed aggregate; maximum size of stone or water/cement ratio do not appear to have a regular influence. The table below gives mean values according to size and shape, together with the results of certain combinations, culminating in an overall average for both shapes and three sizes of 0.0204, again very close to 1/50 and again subject to the same order of variations as was observed in the study of Road Note No.4.

Shape	Mean DA/A/0.01 Change in C F for Maximum Size of Stone:		
	3/8	3/4	1-1/2
Irregular	0.0188	0.0246	0.0223
Crushed	0.0167	0.0222	0.0198
Both taken together	0.0176	0.0233	0.0209

MURDOCK

Murdock's method, (44), is directed towards relating the compacting factor of a mix to the water/cement ratio by weight of the paste, to the aggregate/cement ratio by volume in the mix, to the grading of the combined aggregates and to the way in which they pack. In his paper on the workability of concrete, in Magazine of Concrete Research No. 36 of November 1960, he sets out his arguments. He expresses dissatisfaction with specific surface areas as a means of forecasting workability on the grounds that they do not explain the increase in compacting factor due to increase of maximum size of aggregate, that they are unrelated to the effect of particle shape upon workability and that they over-emphasise the influence of fine particles. He states that particles finer than B.S. No.100 sieve appear to have little influence upon workability and suggests that this is one reason why the specific surface area of the cement fraction has been ignored so illogically.

His next step is to indicate a substitute for specific surface area in the form of a surface index, a value of which has been found for each fraction of the sieve analysis up to the -3" +1-1/2" fraction, by computer analysis of the results from many hundreds of mixes containing various gradings and particle shapes. His curve showing the computer values and his interpretation of these in the form of a smooth curve shows, however, that there are considerable differences between the actual and the smoothed values. To this extent, therefore, the indices must be regarded as approximate. The interesting feature of the values is that while the surface index rises from the (-3" +1-1/2") fraction to the (-14 +25) fraction, it decreases thereafter sufficiently sharply to support the theory that since cement will have a low surface index, the cement content may be ignored.

Murdock deals with packing by modifying Shergold's angularity number, (57), to obtain an angularity index of 1 + 0.15 (Shergold's angularity number). This is a function related to the voids content of the tamped dry aggregate, because the angularity number is the percentage of voids in excess of 33%. The overall effect of particle size distribution and packing is now obtained by multiplying together the surface index and the angularity number, the latter weighted, according to proportions by weight of materials of different angularity numbers in the combination, if necessary.

Upon the question of the influence of aggregate content upon workability, Murdock indicates that below a ratio of 2 for VA/VC the effects of the grading or angularity of the aggregate become negligible and therefore this value of 2 is a suitable datum from which to start measuring the influence of the aggregate/cement ratio by absolute volume. In the same way, he shows that the datum for measuring the influence of water/cement ratio by weight is 0.25

because, as the writer would have put it, this is the lowest water/cement ratio at which the paste gives signs of acting as a lubricant. The complete relation, including the necessary constants, becomes:

$$CF = 0.74 \left(\frac{10(W/C - 0.25)}{f_s f_a (VA/VC - 2)} + 0.67 \right)$$

.... equation 25

where f_s and f_a are Murdock's surface index and angularity index; the remaining symbols have the meanings already assigned.

The discussion above has shown that the prerequisites to a design by the Murdock formula are (i) the grading analysis; (ii) the surface indices for the fractions; (iii) the percentage of voids in the compacted dry aggregate; (iv) the specific gravities of cement and of combined aggregate. From this information the aggregate/cement ratio to satisfy the stipulated water/cement and workability values can be found for any proposed combination of fine and coarse aggregate. No help is afforded in deciding what the proportion of fine to coarse aggregate should be, except the general control exercised by economic considerations.

For the purposes of a study like the present one, however, it is possible to take an existing table of workabilities, water/cement ratios and aggregate/cement ratios for various gradings and maximum sizes of coarse aggregate and find what differences in aggregate/cement ratio are created by using Murdock's method while holding all the other characteristics constant. This is what the writer has done. Road Note No. 4 mixes, for angular coarse aggregate and natural sand, as treated in that section of this work, are well suited to such a programme because the surface index values are constant for each particular grading number; moreover, the angularity index numbers, indicated by Murdock, conform closely to the values found by the writer for a number of crushed stones that he has to use in his work. The values of specific gravity have been brought to the uniform values used in the rest of these studies.

A rearrangement of the equation into the form of equation (26) to give:

$$A = \frac{589.4\ (W/C - 0.25)}{f_s f_a\ (CF - 0.5)} + 159.3$$

enables the weight of aggregate per pocket to be calculated, and subdivided into fine and coarse aggregate according to the percentage of sand, as shown in tables 36 and 37, entitled "Analysis of the Murdock Equation", which lead to tables 38 to 46, containing the one pocket mixes. From these, the tables of A/C against W/C, 47 and 48, and the tables of DA/A/0.01 change in compacting factor, 49 to 51, develop.

Figures 96 to 103 are the triangular diagrams for Road Note No.4 series reworked by the Murdock formula. Considerable differences in the position of comparable lines may be observed. The Murdock lines follow the isolines of constant VW much more closely and therefore exhibit neither the curve at low water/cement ratios found in some Road Note No.4 lines nor the obliquity to the VW isolines typical in the lines for 1-1/2 inch maximum size of aggregate in both Road Note No.4 and McIntosh. It is to be noted however that the Murdock lines do not conform to the unit water content theory. The equation shows that this cannot be so, for the relation of VA/VC and W/C is such that all the lines of VA/VC against W/C must pass through the common point VA/VC = 2 and W/C = 0.25; or, when A/C is plotted against W/C, through the point $(0.25, 2g_a/g_c)$. It has been shown in equation 9 that lines of constant unit water content must meet at $(0, -g_a/g_c)$. Figures 104 to 111 of A/C against W/C for the Murdock values show the linear relation and on figure 104 some lines of constant unit water content have been added to show the difference between the two types of line.

Figures 112 to 119, the rectangular composition diagrams for the same cases of different grading, maximum size and compacting factor as were considered in the examination of Road Note No.4, show some difference from the corresponding figures 34 to 41. For the 3/4 inch maximum size of aggregate the Murdock formula appears to provide more paste and less stone except in the medium and high workability ranges of gradings 1 and 2 when the reverse applies. The changes are minor ones, up to 3%, but this is not so in the case of the 1-1/2 inch maximum size of aggregate where less paste and more stone are provided and the change is often between 5 and 10%.

A side effect of the smoothing and displacement of these curves shows when DA/A/0.01 change in compacting factor results are abstracted for these same cases. The histogram of mean changes, figure 120, comparable to figure 44, shows less spread and skew. The mean value is 0.0169. This is for Road Note No.4 series only; if the whole field of the tables 49 to 51 is considered, on the dubious grounds that the formula has unrestricted application, the mean value is 0.0192. The evidence in favour of the writer's proposal of a constant value for DA/A/0.01 change in compacting factor is somewhat better supported by Murdock's method than by Road Note No.4; the value indicated by Murdock must differ from the writer's in any case, because no adjustment for changed mortar conditions has been considered. It could be done by a calculation of new f_s and f_a values with each alteration of sand to stone ratio and a corresponding change in the compacting factor would result. The process would be somewhat speculative from the writer's point of view without numerous observations of the real mortar excess in Murdock mixes. Upon this matter he has insufficient data to form a proper picture, but has found that with the local aggregates the adjustment required is rather high in many cases. Therefore although the method caters for such treatment the writer has not pursued the matter further, largely because the computation of the aggregate/cement ratio for the adjusted mix has ceased to be simple enough for site work. The principle purpose of the examination has been served - to find if the range of DA/A/0.01 ~~inch~~ change in compacting factor is narrow enough to support the writer's proposal and to see the factors causing the spread, under conditions of constant sand/stone ratio.

Figures 121 to 128 diagrams of A/C against compacting factor, which follow the histogram, are for discussion later in the section upon the writer's method and his workability function.

FULTON

Fulton's methods, developed for South African conditions, are naturally of great interest to engineers practising in this country. The first method, published in 1955, (31), and reproduced in the 1957 edition of his textbook, (32), consisted of tables of the compositions, by weight and by volume, of combinations of three maximum sizes of stone with three gradings of sand, defined by their fineness moduli. The object was to enable one to find a trial mix and general rules for its adjustment were provided. One of these recommended the withdrawal of sand and stone in the same relative proportions where it is desired to increase workability. The amount of change was not stated and the writer has indicated earlier that he does not agree with this type of adjustment on its own, because of the effect it has on mortar conditions. The writer still uses Fulton's 1955 tables as a starting point for mix design with his students since they are very easy to use and an estimate of the fineness of the sand is all that is needed, although strictly speaking the sieve analysis should be performed to determine the fineness modulus. The mixes in the table are intended to give 3 to 4 inches slump with normal South African aggregates. With the aggregates of the Cape Peninsula, the workability is commonly higher than this and the mortar excess is high, meaning that the trial mix can be used, pending adjustment. This is an advantage and the writer recommends that in any cases of doubt it is better to adjust towards the desired mix from trial mixes with more workability and an excess of mortar. If there is uncertainty also about the standard deviation of works cubes, because the control is dubious, then a lower water/cement ratio can be contemplated as well. In the case of the Fulton method, the water/cement ratio is obtained from graphs and the laboratory cubes in general are 20 to 30% above the tabulated strengths, which gives a reasonable margin to meet the difference between laboratory and site conditions.

The 1961 edition of Fulton's textbook incorporates the concept of water demand of aggregates, as mentioned earlier. This required grading analyses of the aggregates, determination of their bulk densities or voids content and calculation of the water demand before entering mix tables to find the trial mix. The writer feels that, although this procedure is likely to give a trial mix nearer to the intended slump of 3 to 4 inches, the gain in achieving this is outweighed by the effort required. Furthermore, if the desired slump is not the 3 to 4 inches basic to the tables, adjustment is needed for the difference. An indication is given that a change of approximately 20 pounds in the unit water content will double or halve the slump. The mix can now be determined for slumps other than 3 to 4 inches, using the revised unit water content or water demand, but retaining the same water/cement ratio. It is evident that although these tables are predominantly based on American Concrete Institute practice, the method of adjustment is not the same. The example given is that of a mix, containing 350 pounds of water, whose slump of say 4 inches would change to 2 inches at 330 pounds or 8 inches at 370 pounds. The A.C.I. method indicates that the values to try for 2 and 8 inches slump would be 330 and 390 pounds respectively, based upon 3% change in the unit water content per inch change in slump required. Suppose however that instead of a desired slump of 2 inches a trial mix gave ½ inch slump with a unit water content of 350 pounds, Fulton's adjustment would cause about 20 pounds to be added to give an expectation of one inch slump and about a further 20 pounds would be needed to raise the slump to 2 inches. For an increase of 1-1/2 inches in slump the unit water content has been altered by about 40 pounds in contrast to the 15 pounds change found by the A.C.I. method. Had the slump of the trial mix been ¼ inch the logical application of the Fulton rule would have needed a further change of 20 pounds approximately to extend the range of slump change by only a further ¼ inch. It becomes evident that Fulton's rule for adjustment should not be applied literally when the slump before the change is either low or high; the same effects are found as with Popovics' thinning factor.

A further point which emerges from this scheme for adjustment is that no alteration of the sand to stone ratio is caused by entering the tables with different unit water contents, all other factors remaining the same. The principle used in the 1955 series, of altering aggregate content while holding the same ratio of sand to stone, and therefore having no compensation for the consequent change in mortar conditions, is still retained.

The 1965 edition contains some changes. The tables are replaced and slightly extended by a triangular diagram, very reminiscent of the writer's; a method of estimating water demand through visual examination of the aggregate is added; and the adjustment of 20 pounds on the water demand to double or halve the slump, while still quoted, is supplemented by a table from Zietsman, (70), giving the change in unit water content per inch change of slump over the ranges 1 to 2, 2 to 3, 3 to 4, 4 to 5, and 5 to 6 inches as 13, 9, 7, 6 and 5 pounds respectively. This gives different answers from the first rule and is preferable, but the writer still has the impression that the fall towards high slumps is too marked. He has gone into the matter in some detail. Having found in connection with another investigation that there was a general relation for Fulton's mixes of the form, $A/C = (W/C)(14000/U^{1.23}) + g_a/g_c$, he considered the derived function for change in A/C per A/C per one inch change in slump in relation to the change in unit water content, DU, to cause unit change in slump. The function has the relatively simple form $D(A/C + K_1)/(A/C + K_1) = (K_2DU)/U$. Where K_1 and K_2 are constants. Solutions of this for Fulton's tabulated values of DU, with various values of U and A/C, reveal that in the extreme cases DA/A/one inch change in slump falls as low as 0.021 and rises as high as 0.092. The central values are all about 0.045. The very large range consorts ill with the writer's proposal, but there are three factors which cause him to believe that the position is not so serious as it appears to be. The first is that he is not convinced that a series of adjustment values should have so great a disparity at the ends of the range and appear to be limited at one end of that range by the very large adjustment which would appear to be the effect of extrapolating beyond it. The second is that the extreme conditions are going to occur very rarely as compared with the central values, which agree well enough with the writer's proposals. Thirdly, all Fulton's adjustments retain a constant sand/stone ratio, which the writer does not consider desirable. It will be seen, if Fulton's adjustments are compared with those of any other method than that of Popovics, that they show greater dispersion and it is suggested that the table under discussion should have some clause restricting the field of its application.

Otherwise, there is little difference between the 1961 and 1965 versions of the mixes to be used. The route to the answer is via water/cement ratio and water demand to find the total aggregate per cubic yard of concrete and then via fineness modulus of sand and maximum size of stone to find the proportion of sand in total aggregate. The cement content per cubic yard is calculated from the water demand and the water/cement ratio.

The writer's tables 52 to 58 give the one pocket mixes for both old and new Fulton mixes and are followed by table 59 containing the aggregate/cement against water/cement values. Figures 129 to 135 are the triangular diagrams, figures 136 to 139 are the composition diagrams, and figures 140 and 141 are graphs of aggregate/cement ratio against water/cement ratio.

In 1955, Fulton followed the general American Concrete Institute method only partially. The mixes of comparable nature do not follow the lines of constant unit water content precisely but zigzag somewhat on either side. On the other hand, a constant stone factor for a given maximum size of stone associated with a sand of a particular fineness modulus is to be seen. The graphs of A/C against W/C do not satisfy equation 9 because of non-uniform unit water content.

The 1961 and 1965 mixes are based on constant unit water content throughout the range of mixes containing one maximum size of stone and one type of sand. The stone factor for such a mix is also a constant. Therefore, as the water/cement ratio changes the mix parts change by sand volume replacing cement volume or vice versa. This condition has been discussed in the section on mortar conditions, where equation 20 applies. To this extent Fulton's method and the A.C.I. method agree. Differences in method of adjustment are found and have been discussed above. The other point of difference in the magnitude of the stone factor in pounds per cubic yard arises in the fineness modulus of the sand, and the maximum size of stone to be used. In general Fulton recommends factors 5 to 10% higher than A.C.I. but indicates that A.C.I. values should be used when the stone is graded, or sand is cheap or volume batching is to be used as opposed to weight batching. These are all reasons why the mortar content may or should be raised relative to stone content. The influence of the method of design upon the composition of the mixes is to be seen in figures 130 to 135, where the identity of the mix lines irrespective of size of aggregate or fineness of sand is demonstrated; in figure 137 where, for constant unit water, the constant position of water line and paste line is shown together with the influence upon the mortar lines of changes in maximum stone size and fineness of sand; and in figures 138 and 139, where the maximum size of stone is held constant and the change in position of the water line and paste line with change of unit water content and also the movement of the mortar line with change of unit water content and fineness modulus of sand is illustrated. Figure 141 shows a series of lines of A/C against W/C satisfying equation 9.

With the exception of the two points already mentioned, the preliminary work needed for the proper identification of Fulton's new mixes and the table for adjustment, the writer considers the method eminently suited to South African conditions and makes considerable use of Fulton mixes as a starting point for trial mixes. To the critics, who complain that Fulton mixes are oversanded, the writer would point out that Fulton recommends higher stone contents than A.C.I. and that oversanding is so much less serious a fault than undersanding as to compel anyone framing a series, for country-wide use under notoriously adverse conditions, to lean towards oversanding.

AMERICAN CONCRETE INSTITUTE

This method, (20), gives recommendations to assist the designer in choosing the water/cement ratio according to the strength and conditions of exposure. Further recommendations cover the workability and the maximum size of aggregate, both in relation to the type of structure.

Before a trial mix can be established information has to be gathered about the shape of the aggregate, rounded or angular, the character of the sand, natural or crushed, and the fineness modulus of the sand. The last entails a grading analysis.

The primary information gives the unit water content to be used and what percentage by absolute volume of the total aggregate is to be sand. These are given for combinations of natural sand of fineness modulus about 2.75 with either rounded coarse aggregate, or angular coarse aggregate, in a range of seven maximum sizes from ½ inch to 6 inches; in each combination the water/cement ratio is 0.57 and the mixes are intended to have 3 inches slump. The adjustments, for other conditions, to be made upon the primary mixes, are listed separately. These are:

(i) For 0.05 change in the water/cement ratio the percentage of sand shall be changed by 1% in the same direction.

(ii) For each change of 0.1 in the fineness modulus the percentage of sand shall be changed by ½% in the same direction.

(iii) For each change of 1 inch in the slump the the unit water content shall be changed 3%.

(iv) For a change to crushed sand the percentage of sand shall be increased by 3% and the unit water content shall be increased by 15 pounds.

In previous references to the A.C.I. method it has been indicated that the important features of the method are the concept of constant unit water content for any series of mixes of different water/cement ratio in which the same stone and sand are combined, the concept of constant yield of stone or stone factor in such mixes and the methods of adjustment for different sets of conditions. It is the adjustment for change of water/cement ratio that causes the stone factor to remain the same, to all intents and purposes, over the range of water/cement ratios from .44 to .75. The stone factor is affected by a change in the fineness modulus of the sand, as given in the second adjustment. The third adjustment, to change the slump, has been considered earlier as leading to equation 18. The fourth adjustment for the effects of replacing natural sand by crushed sand affects both the sand/stone ratio and the unit water content.

To demonstrate the influence of the variables, the writer has prepared tables of one pocket mixes, based on the A.C.I. method, in which four main groups cover the cases of rounded stone with natural sand, angular stone with natural sand, rounded stone with crushed sand and angular stone with crushed sand. Within the groups eight values of water/cement ratio recommended by A.C.I. have been taken for each of the seven maximum sizes of stone listed and for five values of fineness modulus chosen by the writer to cover the range from 2.0 to 3.0. Tables 60 to 82 are the result. From these the tables 83 to 88 were constructed to record the relations of aggregate/cement ratio to water/cement ratio for these mixes. Then, from the third adjustment for slump, the values of DA/A/per one inch change in slump were calculated using equation 18. The results for all 1120 mixes show an average value of 0.0416 and range from 0.0368 to 0.0489. The lowest value is found when a rounded coarse aggregate of very large maximum size and a natural sand are used with a paste of high water/cement ratio; the highest is caused by the use of small ill-shaped aggregates with low water/cement ratio paste. The latter situation is the one most commonly encountered by the writer, who does use adjustment values on the high side (but not solely for this reason) and also uses reduced values when the aggregate exceeds two inches maximum size. The tables show that the fineness modulus of the sand has no effect, but that increasing the maximum size of stone or increasing the water/cement ratio affect the result by increasing the yield of concrete per pocket of cement. A clear indication of the relative importance of such changes on the adjustment is given by the tables.

The broad effect of altering the maximum size of stone upon the composition of mixes made from combinations of rounded or angular stone with natural or crushed sand is shown in the triangular diagrams, figures 142 to 145. The details of water lines, paste lines and mortar lines are given in figures 146 to 153, which demonstrate how a change of water/cement ratio causes little but an exchange of cement for sand or vice versa. The graphs of aggregate/cement ratio against water/cement ratio, in figures 154 to 157, show parts of the fans of lines all meeting at zero water/cement ratio and at a value of the aggregate/cement ratio equal to $- g_a/g_c$. The relative position of all of these lines is dictated by the unit water content values stipulated for the various conditions and the governing equation is equation 9. The histogram of DA/A/one inch change in slump, figure 158, exhibits a mild skew to the right but is compact and has a standard deviation of less than 0.003 about the central value of 0.0416. The A.C.I. method, therefore, affords strong support for the writer's contention that it is feasible to base adjustments of workability upon making a change in the aggregate, per pocket of cement, of some fraction of itself times the desired change in slump, bearing in mind that an increase of aggregate is associated with a decrease in the slump and converse.

The breadth of scope of the A.C.I. method is evident and the ease with which it lends itself to the computation of a wide variety of mix compositions is shown clearly in the tables emerging from this examination. The smoothness of the curves in the diagrams stems from the fact that they are all derived from one basic set of values by applying specified changes. This could create an illusion of reliability where it was non-existent, but the writer does not think that this is the case. He has used A.C.I. methods to a considerable extent in the past without finding them deceptive, except insofar as it must be accepted that descriptions of aggregates are imperfect and misleading. In employing Fulton's mixes, the writer uses now a closely related group for trial mixes.

Much of the theoretical justification for his simpler approach to adjustment is to be found in extensions of the A.C.I. principles to the problem of simultaneous attack upon faults in workability and mortar conditions. While not relying wholly upon this to establish his case, the writer feels that it adds weight to his arguments.

PORTLAND CEMENT ASSOCIATION

The P.C.A. method, (19), has many features similar to the A.C.I. method. Recommendations are made on water/cement ratio, slump and maximum size and grading of aggregates in much the same way. The tables of trial mixes intended to have 3 inches slump contain unit water contents which vary with the maximum size of stone, while the percentage of sand varies with the maximum size of stone and the fineness modulus of the sand. The same 3% adjustment in unit water content per one inch change of slump and the same correction of 15 pounds of water per cubic yard and 3% increase in percentage of sand for a change to crushed sand instead of natural sand are indicated. Again the grading must be known before starting a mix design.

The differences lie in the reduced number of maximum sizes of stone in the P.C.A. tables and in the grouping of the mixes into three categories for sands of fineness modulus 2.2 to 2.6, 2.6 to 2.9 and 2.9 to 3.2 respectively, whereupon the A.C.I. adjustment for a change in the fineness modulus of the sand falls away. The other A.C.I. adjustment of 1% in the percentage of sand for 0.05 change in the water/cement ratio is not mentioned. The numerical differences in the quantities recommended can be seen in tables 93 to 95 and figures 159 to 163 when comparison is made with the equivalents in A.C.I. e.g. figures 143, 148, 149 and 155. The P.C.A. gives an aggregate content about 2% more by absolute volume and a higher stone factor. With regard to the analysis of DA/A/one inch change in slump, it has been omitted in this case since the small differences in aggregate yield between P.C.A. and A.C.I. would show as still smaller differences of DA/A/one inch slump change and insofar as the A.C.I. supports the writer's proposals so does the P.C.A.

BUREAU OF RECLAMATION, U.S.A.

In the first edition of their Concrete Manual in 1938, the Bureau set out a method of mix design and adjustment based upon the following.

(i) A known fineness modulus of the fine aggregate. This was used to select a ratio of coarse aggregate to fine aggregate, using a chart whose basic equation was:

$$\frac{\text{Coarse Aggregate}}{\text{Fine Aggregate}} = \text{Constant} - 1.25 \text{ (fineness modulus)}$$

The value of the constant varied with the maximum size of coarse aggregate and had the following values:

Maximum Size	3/4"	1-1/2"	3"	6"
Constant	4.5	4.75	5.25	6.0

The range of fineness modulus was restricted, from 2.5 to 3.0.

(ii) The absolute volume relationship,

$$\text{Cement content in barrels per cu.yd.} = \frac{6.75}{1.506\ W/C + 0.5684\ A/C + 0.478}$$

This is a form of equation 3, discussed earlier, with the values based upon specific gravities of 2.65 and 3.15 for aggregate and cement respectively. With this is associated the rule that a change of 0.05 in the specific gravity of the aggregate from the value of 2.65 changes the cement content per cubic yard by 0.02 barrels. The partial differential of cement content with respect to specific gravity, which appears as a reciprocal in the denominator of the expression for cement content, is the source of this rule.

(iii) The unit water content was substantially the same for mixes of the same materials and with the same grading but in which the water/cement ratio was changed between the limits of 0.35 and 0.70.

(iv) Laboratory data relating changes in water/cement ratio for changes in the ratio of coarse to fine

Maximum Size of Aggregate	Coarse Aggregate/ Fine Aggregate	DA/A/1" Slump
3/4"	1.0	0.0469
	1.1	0.0453
	1.2	0.0450
	1.3	0.0440
	1.4	0.0432
	1.5	0.0425
	1.6	0.0424
	1.7	0.0414
	1.8	0.0411
	1.9	0.0440
	2.0	0.0432
	2.1	0.0425
	Mean:	0.0436
1-1/2"	1.4	0.0448
	1.5	0.0437
	1.6	0.0429
	1.7	0.0415
	1.8	0.0399
	1.9	0.0388
	2.0	0.0386
	2.1	0.0374
	2.2	0.0372
	2.3	0.0398
	2.4	0.0390
	2.5	0.0384
	Mean:	0.0402
3"	1.6	0.0412
	1.7	0.0406
	1.8	0.0407
	1.9	0.0401
	2.0	0.0402
	2.1	0.0396
	2.2	0.0399
	2.3	0.0392
	2.4	0.0390
	2.5	0.0385
	2.6	0.0384
	2.7	0.0376
	Mean:	0.0396
6"	1.8	0.0408
	1.9	0.0402
	2.0	0.0404
	2.1	0.0397
	2.2	0.0395
	2.3	0.0390
	2.4	0.0396
	2.5	0.0406
	2.6	0.0408
	2.7	0.0413
	2.8	0.0408
	2.9	0.0395
	3.0	0.0395
	3.1	0.0398
	3.2	0.0394
	Mean:	0.0400

One observes that the 3/4 inch aggregate values do not agree very well with the rest and that higher corrections occur when the ratio of coarse aggregate to fine aggregate becomes low. Nevertheless, the broad picture is that DA/A/one inch change in slump does not vary greatly over a wide range of sizes, proportions and water/cement ratios. This confirms an idea which is the essence of the writer's proposals.

A theoretical treatment of the Bureau of Reclamation method of adjustment of slump while retaining a selected water/cement ratio is given below, for one pocket mixes.

Let the suffixes 1, 2, etc distinguish between mixes containing one pocket of cement and let it be supposed that a decrease of 1" slump is to be made in Mix 1, but that the final mix shall have the same water/cement ratio as Mix 1, for reasons of strength.

$$62.4Y_1 = W_1 + 94/g_c + A_1/g_a$$

Now, to reduce the slump 1", the water/cement ratio is to be decreased by 0.02, or a decrease of 1.88 lb. of water is made.

$$62.4Y_2 = (W_1 - 1.88) + 94/g_c + A_1/g_a$$

$$Y_2 = Y_1 - \frac{1.88}{62.4} = Y_1 - 0.0302$$

The unit water content of this mix will be

$$\frac{27 \times (W_1 - 1.88)}{Y_2} = \frac{27 \times (W_1 - 1.88)}{Y_1 - 0.0302} = U_2 \text{ lb/cu.yd.}$$

This is presumed satisfactory for the lowered slump for mixes of the same materials having the same grading, even if the water/cement ratio is now changed. Therefore the water/cement ratio may be restored to its previous value, holding the unit water content at U_2.

From this one deduces that

$$Y_3 = \frac{27 W_1}{U_2} = \frac{27 W_1 (Y_1 - 0.03)}{27 (W_1 - 1.88)}$$

but

$$62.4 Y_3 = W_3 + 94/g_c + A_3/g_a$$

$$\text{where } W_3 = W_1$$

therefore

$$A_3 = g_a\,(62.4\ Y_3 - W_1 + 94/g_c)$$

$$A_1 = g_a\,(62.4\ Y_1 - W_1 - 94/g_c)$$

$$A_3 - A_1 = 62.4\ g_a\,(Y_3 - Y_1)$$

$$= 62.4\ g_a\left(\frac{W_1\,(Y_1 - 0.03)}{W_1 - 1.88} - Y_1\right)$$

$$= 62.4\ g_a\left(\frac{W_1Y_1 - 0.03W_1 - W_1Y_1 + 1.88Y_1}{W_1 - 1.88}\right)$$

$$= 62.4\ g_a\left(\frac{1.88Y_1}{W_1 - 1.88} - \frac{0.03W_1}{W_1 - 1.88}\right)$$

$$DA/A/1''\ \text{Slump} = \frac{A_3 - A_1}{A_1}$$

$$= \frac{62.4g_a}{A_1}\left(\frac{1.88Y_1}{W_1 - 1.88} - \frac{0.03W_1}{W_1 - 1.88}\right)$$

A similar argument leads to the equation when an increase of 1" slump is required:-

$$DA/A/1''\ \text{Slump} = \frac{62.4g_a}{A_1}\left(\frac{1.88Y_1}{W_1 + 1.88} + \frac{0.03\ W_1}{W_1 + 1.88}\right)$$

The writer submits that this expression is too cumbersome to use in practice, but it has been included here because it is quite closely related to equation 17 and, in turn, to the American Concrete Institute method.

Modern editions of the Bureau of Reclamation Manual no longer contain the lengthy tables described above and the method given now is similar to that of the American Concrete Institute. Since this has been examined already, no further progress in the present study would be forthcoming from what is virtually a repetition of this examination and no tables or diagrams are presented in illustration of the current Bureau information.

POPOVICS.

For the present purposes, Popovics' method, (47,48, 49,50,51) may be considered as consisting of the application of two equations for mix parts and two equations for the adjustment of workability, all restricted in their use by certain limits of validity. The equations and their limitations follow.

CB = Cement content in bags per cubic yard for stiff mixes

$$= \frac{g_a\ (18\ (1 - 0.01v) - 0.3\ (m - 6)^2 - 2}{A/C + 0.5g_a}$$

.... Equation (30).

The value 2 in the numerator is replaced by 2.5 for plastic mixes.

Water/cement ratio for stiff mixes

$$= \frac{0.27}{CB}\ (\ (m - 6)^2 + 8\ ) + 0.14$$

.... Equation (31).

The values of 0.27 and 0.14 are replaced by 0.326 and 0.17 respectively for plastic mixes.

An equation for adjusting slump:

$$\frac{\text{Unit water content after adjustment}}{\text{Unit water content before adjustment}} = \left\{ \frac{\text{Slump after adjustment}}{\text{Slump before adjustment}} \right\}^{1/10}$$

= Thinning factor for slump.

An equation for adjusting compacting factor:

$$\frac{\text{Unit water content after adjustment}}{\text{Unit water content before adjustment}} = \left\{ \frac{\text{CF after adjustment} - 0.65}{\text{CF before adjustment} - 0.65} \right\}^{1/i}$$

= Thinning factor for compacting factor.

Where v = the percentage of voids by volume in the finished concrete; m = the fineness modulus of the combined aggregates; $i = 0.94CB - 1.70$; and the rest of the symbols have the meanings already assigned.

According to reference (48) the equation for cement content may only be used in the following ranges: m, 3.5 to 6.5; maximum size of stone, 1 to 2.5 inches; cement content, CB, 3 to 9; specific gravity of cement, 2.9 to 3.2; water needed to obtain a cement paste of normal consistence, 23% to 33%; air content 0 to 10%. Stiff mixes are described as having ½ to 1 inch slump and plastic mixes as having about 4 inches slump. In reference (49), where tables are given for stiff mixes without entrained air, the slump is quoted as about 1½ inches yet the equation upon which the tables are based is equation 30 with v set at 1%, i.e.

$$CB = \frac{15.8 - 0.3(m - 6)^2}{A/C + 0.5g_a}$$

It is stated also that for mixes of about 4 inches slump the values of CB so calculated should be reduced by about 3%, which is an acceptable approximation for the substitution of 2.5 for 2.0 in equation 30, provided v is low. For 4% of entrained air, a decrease of 0.2 in A/C is indicated.

The equation relating unit water contents and slumps is restricted to slumps between 1 inch and 5 inches and the equation relating unit water contents and compacting factors applies between 0.75 and 0.95 compacting factor. The writer considers that an adjustment technique which breaks down at an extremity of the possible measurements of workability, because the adjustments prove absurd, is open to the criticism that it cannot suddenly have become unsatisfactory, but must have deteriorated in approaching whatever terminal point is declared the end of the range of applicability. This is disturbing, quite apart from the fact that one is debarred from using the method of adjustment if the workability value, observed or desired, is outside of the stipulated range.

It will be observed that the term $(m - 6)^2$ appears in the equation for cement content and again in the equation for water/cement ratio. If it be taken that the water/cement ratio has been chosen for a given case then equation 30 indicates that the least cement content is associated with m equal to 6, and hence the highest aggregate content obtains. This is confirmed by consideration of equation 31. Yet Popovics has no means of controlling the percentage of sand in the combined aggregates except through the fineness modulus of the combination. This is not enough to exclude honeycombing. For any coarse aggregate of maximum size 1½ inches containing no sand size material, but only particles greater than 3/16 inches, the fineness modulus is 7. If this is combined with sand, fineness modulus 2, to obtain a combined aggregate with the optimum fineness modulus 6, then the proportion of sand therein is 1/5 which is dangerously low for angular aggregates, even though the sand is fine. It follows that one may be compelled to use combined aggregates with fineness moduli differing from the optimum, and an indication that this may be so is given in the statement that adjustment of the blending of the aggregates may be needed as well as adjustment of the water content. Disregarding such changes in the proportion of sand necessitated by attempts to operate at optimum fineness modulus, any alteration in workability through change of the unit water content is associated with a change in the blending of the combined aggregate. This is the only method, that the writer has found, where the mortar conditions are changed with the adjustment of workability. The point is discussed later when reference to the results from the examination of Popovics' mixes can be made.

The equations show that, before a design mix, can be attempted, it is necessary to know, from a grading analysis, the fineness modulus of the aggregates, and also their specific gravities. Since the method is intended primarily to provide mixes satisfying a specified cement factor and a specified water/cement ratio simultaneously, the equations for CB and W/C are to be solved simultaneously for m and A/C. The operation is shortened by the use of tables.

The writer began his examination of the method by considering mixes in which the fineness modulus of combined aggregates ranged from 3.5 to 6.5 by intervals of 0.5 and for each fineness modulus he took aggregate/cement ratios of the integral values from 2 to 12. The values of the cement and water contents for stiff and for plastic mixes CS, CP, WS and WP respectively are directly available from these data by the solution of equations 30 and 31. To study one pocket mixes, he assumed a fineness modulus of stone throughout as 6.75, a value approximating to the average found for a number of local stones of the size range given by Popovics. This was considered as giving, in combination with sand of fineness modulus 2.0 and sand of fineness modulus 2.75, combined aggregate of fineness modulus 3.5 to 6.5 and hence the percentage of sand was calculated for each case, "SAND F" and "SAND M" From the aggregate/cement ratios, the aggregate weights per pocket, A, are known and may be divided into sand weights, SF and SM, and stone weights, LF and LM, according to the percentages of sand. The results of the preliminary analysis are given in tables 96 and 97. Each row J of these furnishes four mixes in the tables, 98 to 104, of one pocket mixes, which are followed by the tables of aggregate/cement ratio, 105 and 106. Figures 164 and 165, the triangular diagrams, show the interesting grids obtained from the results. The series seem to have much more paste than one would expect, particularly evident at low values of m. This is confirmed in the partial rectangular diagrams 166 and 167, of mix composition. From each kind of diagram it is seen that the mixes of constant m do not follow lines of constant unit water content. Figures 168 and 169, showing A/C against W/C, show that the lines for different values of m meet at $(0.14, -\frac{1}{2}g_a)$ for stiff mixes and at $(0.17, -\frac{1}{2}g_a)$ for plastic mixes. This is explained by the fact that if in equations 30 and 31 for stiff mixes, m is a constant, then

$A/C + \frac{1}{2}g_a = K_5 (W/C - 0.14)$; similarly, for plastic mixes, $A/C + \frac{1}{2}g_a = K_6 (W/C - 0.17)$ where K_5 and K_6 are constants. The lines of constant unit water content cross these lines, themselves meeting at $(0, - g_a/g_c)$. It follows that, when an alteration in workability is required, causing in turn a change in the unit water content, while the water/cement ratio is held constant, then the transfer to a new value of A/C on the same ordinate of constant W/C will change the value of m in the adjusted mix. There is an underlying conformity with the constant unit water content theory; individual mix points on the lines are found to have unit water contents satisfying equation 9, as demonstrated below.

Figure 171 illustrates the operation. Two lines from the one pocket mix tables for m = 6 have been drawn, one for stiff mixes and one for plastic mixes, passing respectively through $(0.14, - \frac{1}{2}g_a)$ at point B and $(0.17, - \frac{1}{2}g_a)$ at point C. They meet at A very nearly on the axis W/C = 0, as do all similar pairs having the value of m equal, although A adopts different positions. Upon the lines the values of U for the various mixes have been marked and some dashed lines of U = a constant have been superimposed to verify these. Consider the point F representing a plastic mix of fineness modulus 6 and water/cement ratio 0.5. The unit water content is 376 pounds per cubic yard. Assume that it has a slump of about 4 inches and that this has to be adjusted to 3/4 inches to get the equivalent stiff mix. The thinning factor for this change is 0.85 so that the new unit water content required is 376 x 0.85 or 320 pounds per cubic yard. The point G satisfies this and the water/cement ratio of 0.5 simultaneously; but this point lies almost exactly upon the line for stiff mixes having a value of m equal to 5. Therefore the adjustment calls for an increase of sand content. This agrees with the nature of the change proposed by the writer where a decrease in paste content, with an increase in aggregate content, is accompanied by an increase in sand content to fill the increased volume of stone voids.

There is an anomally about a change to a plastic mix from a mix represented by E, a stiff mix of fineness modulus 6, of water/cement ratio 0.5 and unit water content 288 pounds per cubic yard. Should one apply the thinning factor 1.18 to get a new unit water content of 338 pounds per cubic yard, the point would lie somewhere near G, but this point would not be satisfied by increasing the fineness modulus as one would in an ordinary case; the optimum fineness modulus for plastic mixes is already represented by the ACF and only a move to the point F would secure the desired change. This is, however, a special case and normally the operation of increasing workability would cause an increase in the fineness modulus of the combined aggregates. An increase of paste would be associated with a decrease of sand content.

In considering DA/A/one inch slump in relation to Popovics' equations the writer considered first the general relations:-

$$A/C + \tfrac{1}{2}g_a = \frac{g_a(15.8 - 0.3(m - 6)^2)\ (W/C - 0.17)}{0.27\ (\ (m - 6)^2 + 8)}$$

for stiff mixes and,

$$A/C + \tfrac{1}{2}g_a = \frac{g_a(15.3 - 0.3(m - 6)^2)\ (W/C - 0.14)}{0.326(\ (m - 6)^2 + 8)}$$

for plastic mixes. He assumed they possessed slumps of 3/4 inches and 4 inches respectively and worked out D(A/C)/(A/C)/3¼ inches change in slump for various values of m and W/C. He found the process much too cumbersome to be a practical proposition. As a second approach, the writer plotted the matching pairs of mix points from figures 168 and 169 on the appropriate slump ordinates to get figure 171, and fitted to them a workability function of the form Slump = $K_1 \log_e A/C + K_2$. The value of K_1 which seemed most suitable was - 7. The values of K_2 were used to set the lateral positions of suitable parts of the curve in relation to the mix points. The changes under consideration refer to mixes in which there is no change in the percentage of sand because the fineness moduli remain the same. The value of K = -7 agrees therefore with other similar examinations where DA/A/one inch change of slump has been investigated and found to correspond to a value between 1/20 and 1/25; 1/7 is 3.25/22.7 and thus lies between 3.25/20 and 3.25/25. It seems that, despite the unusual form of the equations for DA/A/3.25 inches slump and the tendency to excessive paste, Popovics' mixes also afford support to the writer's arguments. In the event of change of fineness modulus being taken into account, there would be flattening of the lines joining pairs of mix points on the lines of slump 3/4 inches and slump 4 inches. This causes an increase in K_1 and suggests, as does the writer, that when the mortar conditions are changed as well as the workability then the values of 1/20 to 1/25, (found for no change in mortar conditions), are not enough and that values of 1/15 to 1/16 are more realistic for DA/A/one inch change in slump.

Although the writer cannot agree with Popovics' method of finding the change in unit water content, this does not affect the argument. Whatever process is used, a change of unit water content causes a change in mortar conditions for the same water/cement ratio, and that change has been shown to be of the nature proposed by the writer and to have an effect upon the value of DA/A/one inch change in slump in the direction that the writer's own work suggests that it should go.

GRANGER

Granger's method of mix design, (34), involves trial mixes which are adjusted by the use of a pressure test apparatus he devised for the purpose. It is not germane to the present discussions. However the laboratory work done in the course of his investigations is recorded in his Ph.D. thesis for the University of Cape Town and comprises mixes for which slump or compacting factor or both are recorded. The aggregates used were similar in many cases to those the writer has to use in his current mix designs. Since they are the work of an independent and qualified concrete technologist, they serve as a source of information against which the writer can test his proposals. Granger considered three water/cement ratios, 0.45, 0.57 and 0.70 and, with each of these, five aggregate/cement ratios are taken, selected from 3.6, 4.0,4.5,5.7,6.65 and 8.0. Figure 172 illustrates the result. The proportions in the combined aggregates are varied to give five different constitutions so that there are 225 mixes in all.

Tables 107 to 111 record the one pocket mixes; table 112 gives the water/cement ratios and aggregate/ cement ratios; table 113 records DA/A/one inch change in slump where the observations permit this. The average is high, 0.112, but this is explicable when reference is made to figure 173 where it will be seen that high changes on approach to zero slump are affecting the average. These should have been omitted but the analysis was done prior to the construction of the figure and such influences can be ignored in construing the meaning of the diagram. No analysis of DA/A/0.01 change in compacting factor was made as the observations of compacting factor were considered too sparse for the purpose.

The main purpose of the examination was to plot the diagrams 173 and 174 showing the relation of the aggregate/cement ratio and workability. There have been superimposed on these the curves of the workability functions proposed by the writer and the result is encouraging. In the main, the curves agree with the pattern of lines joining Granger's mixes, taken in associated sets, almost all the exceptions occur near zero slump or near a compacting factor of 1.0. In these regions one does not expect precision.

KING

The examinations of the methods of mix design have provided the information concerning the values of DA/A/change in workability summarised below:-

Method	No. of Mixes in Series	$1/K_1$ for Slump		$1/K_1$ for Compacting Factor	
		Average	Range	Average	Range
CP 114	198	0.150	0.025-0.375	0.0255	0.0175-0.0375
Road Note No.4	206	-	-	0.0206	0.040-0.400
McIntosh	694	-	-	0.0204	0.080-0.460
Murdock	416	-	-	0.0192	0.060-0.240
Fulton	324	0.0450	-	-	-
A.C.I.	1120	0.0416	0.036-0.049	-	-
P.C.A.	84	-	-	-	-
Bureau of Reclamation	2040	0.0410	0.037-0.047	-	-
Popovics	308	0.050	-	-	-
Granger	225	0.050	-	-	-

The weighted average for DA/A/one inch change in slump is 0.043 if the CP 114 values are omitted and 0.048 if they are included. The weighted average for DA/A/0.01 change in compacting factor is 0.021.

The chief cause of departure from the average value is in the use of very large or very small maximum size of aggregate and the writer has indicated that he himself varies the value of K_1 for large aggregate. He agrees that it does not greatly affect the simplicity of the method to use several values of K_1 to improve this. The A.C.I. examination, in particular, indicates the general trend and how the average value can be so amended for change of maximum size.

The other influences, less important than maximum size of aggregate, are aggregate/cement ratio and water/cement ratio. The worst combinations are high aggregate/cement ratio with low water/cement ratio and its opposite. These are the least likely conditions in mix design. A comparison has been made, in the case of Murdock's method to illustrate the relation between the tabulated mixes, for which the average value of DA/A/0.01 change in compacting factor was 0.0192 and the writer's workability function using K_1 = 0.50, i.e. the nearest round number to 1/1.92. Figures 121 to 128 are the relevant diagrams showing the deviations of the writer's system of curves from the lines joining Murdock's mix points. As noted earlier, similar diagrams have been used with Popovics' and Granger's mixes. They provide evidence that the writer's curves are near enough to the general pattern found in the mix methods for him to submit that within the limits of practical difficulties and of experimental observation of workability, he has made out a case, for his technique of altering workability, quite strong enough to warrant its acceptance.

It remains to show that, when this is associated with the simultaneous adjustment of mortar conditions, the complete technique continues to represent the true meaning and intent of mix adjustment, demonstrated by a general correlation of experimental results with the curves of workability function in which the appropriate values of K_1 and K_2 have been inserted. So far, only Popovics' mixes have had a change in the percentage of sand associated with change of workability. The 468 mixes listed by the writer all have this feature except the last 97.

The first 95 mixes were done some years ago when the writer was studying theoretical mortar excess in mix design and looking for a pattern relating it to workability and mix parts. There are five sets, each approximately one fifth of the whole, in which stone of 3/4 inch maximum size was mixed in turn with fine, medium and coarse sands of fineness moduli 2.0, 2.7 and 3.1 respectively and in which $1\frac{1}{2}$ inch maximum size of stone was used with the fine and the medium sands. The stone was angular crushed stone complying with BSS 882 grading requirements. Figures 177 and 178 represent the results taken from the tables 114 and 115 of Appendix 1.

The next 276 mixes, whose identification numbers are from 96 to 371 in tables 115 to 121, are the complete series of undergraduate exercises in concrete mix design for the last three years. They include every possible error of judgment, assumption and observation and are the work of about 200 different operators, in groups of three or four. In each case the goal was achieved of a final mix of the desired workability and mortar condition. They are specifically included here, in preference to work by the writer, to show that this is not a technique which works for the inventor alone, that the answer is usually found in about three trials and that errors do not prevent one from solving the problem ultimately. The maximum sizes of stone range from 3/8 to $2\frac{1}{2}$ inches and both natural and crushed sands were used, with different fineness moduli. Most of the work is with stone of 3/4 inch maximum size and fine sand. A general pattern of agreement with the workability curves is to be seen. There is a most interesting point however. All the adjustments of workability were made using one fifteenth change in the aggregate per one pocket mix for every inch of slump change desired and all the adjustments of mortar excess were made by an exchange of one two hundred and fiftieth of the stone per pocket for each 0.01 of change in the real mortar excess wanted. Yet the workability functions have been drawn for $K_1 = 25$ in the case of slump and $K_1 = 0.5$ in the case of compacting factor. These K_1 values are substantially those found from the examinations of mix methods, showing that the writer's amended values are effecting substantially the same adjustments. No adjustments were made on a basis of compacting factor, nevertheless, the recorded values, when plotted, fall in with the pattern. Very often it is found that bad deviations from the general form occur in both figures 179 and 180, for the same associated set of mixes, showing that a batching error is probably the cause of the trouble.

No doubt there is an anomaly to be considered. The relation between slump and compacting factor is not linear. The writer looked at the relations he had found, in several hundred mixes, between the observed slumps, compacting factors and Wigmore numbers. The table of values below was taken from the best curves he could draw for compacting factor against slump and Wigmore number against slump. The scatter was considerable and the writer does not consider a set of observations incompatible or misleading unless the observed value of the compacting factor is outside of the range contained by the tabulated value $\pm$ 0.05 or unless the observed value of the Wigmore number is outside of the range contained by the tabulated value $\pm$ 25%, where in each case the tabulated value is based on the slump observation. The table terminates at 6 inches slump, for the writer mistrusts slump test results above this value.

Slump in Inches	Compacting Factor	Wigmore Number
$\frac{1}{4}$	0.70	440
$\frac{1}{2}$	0.75	295
$\frac{3}{4}$	0.79	230
1	0.81	185
$1\frac{1}{2}$	0.83	160
2	0.86	130
3	0.89	100
4	0.92	75
5	0.94	65
6	0.96	50

In suggesting that the same kind of adjustment should be used for either slump changes or compacting factor changes, the writer concedes that he is disregarding the non-linearity of the curve of compacting factor against slump, shown in his own table. However, he does not claim that his adjustment for workability is precise where large alterations are involved, and, where the alterations are small, the non-linearity is of minor importance.

The third set of mixes, whose identification numbers are from 372 to 468 in tables 121 to 123, were constituted from a very badly shaped crushed stone of maximum size $1\frac{1}{2}$ inches, a natural sand of fineness modulus less than 2.0 and crushed sand. These were combined to obtain grading No.1 of Road Note No.4 and the object was to construct a table like those in the Note for these aggregates, all from the Cape Town area and none complying with BSS 882. Figure 181 shows the result. Only compacting factor values were recorded for this purpose. A lower value of K_1 becomes necessary under such adverse circumstances which unfortunately are somewhat common in South Africa.

The last two tables in Appendix 1 are for reference. Table 114 gives values of $K_1 \log_e(A/C)$ for a number of different constants. The writer uses these to prepare a single curve for each constant under review and traces what parts of the curve he needs, between the desired values of A/C, setting the curve laterally to match the mix lines to be fitted. Table 125 is a conversion table for aggregate per pocket and aggregate/cement ratio, which serves also for water per pocket and water/cement ratio if both columns are divided by 10.

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POSTSCRIPT

"The due and thorough incorporation of the cement, sand, and shingle or gravel, with the least amount of water, is the ABC of the process of concrete making, and unless this is rigorously attended to much disappointment will be experienced. The whole of the ingredients should be well mixed first in a dry state, and when this is thoroughly done a quantity of water added to render the mixture plastic enough to be put into moulds or placed between the boards used for forming the walls. As a rule the less quantity of water you can use the better. The concrete should be well rammed in as dry a state as is consistent with the proper requirements of the material, for too small a quantity of water would be quite as injurious as an excess; again, that would be materially influenced by the amount of percussion applied by the impingement of the rammer. The rammer should be as heavy as can conveniently be used. Sand, where choice exists, should be as rough and coarse as possible. A rotten or friable aggregate is to be avoided. The sand must fill up the vacuities in the compound. Where practicable, concrete blocks should be placed for some days or weeks in water. Concrete, when so treated and carefully and thoroughly mixed, will be immensely superior in quality to the ordinary sloppy and roughly-handled mixture commonly called concrete, only in many cases entitled to the name because it contains certain proportions of the necessary ingredients."

Henry Reid, 1868.

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Concrete mix design by convergence.

Appendix 1: Tables.

W. H. King.

IDENTIFICATION OF C P 114 MIXES

SAND ZONE**	MAXIMUM SIZE OF STONE, INCHES	WORKABILITY *	IDENTIFICATION NUMBER J	
			NATURAL SAND	CRUSHED SAND
1	3/8	L	1 - 3	109 - 111
		M	5 - 6	113 - 114
		H	8 - 9	116 - 117
	1/2	L	10 - 12	118 - 120
		M	13 - 15	121 - 123
		H	17 - 18	125 - 126
	3/4	L	19 - 21	127 - 129
		M	22 - 24	130 - 132
		H	25 - 27	133 - 135
	1-1/2	L	28 - 31	136 - 138
		M	31 - 33	139 - 141
		H	34 - 36	142 - 144
2	3/8	L	37 - 39	145 - 147
		M	41 - 42	149 - 150
		H	44 - 45	152 - 153
	1/2	L	46 - 48	154 - 156
		M	49 - 51	157 - 159
		H	52 - 54	161 - 162
	3/4	L	55 - 57	163 - 165
		M	58 - 60	166 - 168
		H	61 - 63	169 - 171
	1-1/2	L	64 - 66	172 - 174
		M	67 - 69	175 - 177
		H	70 - 72	179 - 180
3	3/8	L	73 - 75	181 - 183
		M	77 - 78	185 - 186
		H	80 - 81	188 - 189
	1/2	L	82 - 84	190 - 192
		M	85 - 87	193 - 195
		H	89 - 90	197 - 198
	3/4	L	91 - 93	199 - 201
		M	94 - 96	202 - 204
		H	97 - 99	205 - 207
	1-1/2	L	100 - 102	208 - 210
		M	103 - 105	211 - 213
		H	106 - 108	214 - 216

* L = LOW M = MEDIUM H = HIGH

with M and H values omitted where not given in C P 114 table, otherwise with W/C ratios of 0.56, 0.63 and 0.71 for each workability

** The fineness moduli range from 4.00 to 2.71, 3.37 to 2.11, 2.78 to 1.71 for natural sands of Zones 1, 2 and 3 respectively. The corresponding values for crushed sands are 4.00 to 2.61, 3.37 to 2.01 and 2.78 to 1.61 respectively.

STANDARD MIXES CP 114 AS ONE POCKET MIXES

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
53	147	168	462	84	89	99	320	1442	261	151	278	310	127	447	467	473	1
59	168	210	531	93	102	124	367	1446	253	131	277	338	100	434	445	451	2
67	189	252	602	106	115	149	417	1442	253	115	274	357	84	433	429	435	3
59	168	147	468	93	102	87	330	1418	282	146	309	263	185	483	534	540	5
67	189	189	539	106	115	112	380	1417	278	127	301	294	145	476	500	506	6
59	168	105	426	93	102	62	305	1396	305	158	334	203	300	522	616	621	8
67	189	147	497	106	115	87	355	1398	297	136	322	245	215	509	563	569	9
53	147	210	504	84	89	124	345	1460	242	140	258	360	82	415	412	418	10
59	168	252	573	93	102	149	392	1461	237	123	260	380	66	406	400	406	11
67	189	294	644	106	115	174	442	1456	239	109	259	393	58	409	392	397	12
53	147	147	441	84	89	87	308	1432	272	157	289	282	159	465	500	506	13
59	168	189	510	93	102	112	355	1437	262	136	287	315	122	449	471	477	14
67	189	231	581	106	115	137	405	1434	261	119	283	337	101	447	450	456	15
59	168	147	468	93	102	87	330	1418	282	146	309	263	185	483	534	540	17
67	189	189	539	106	115	112	380	1417	278	127	301	294	145	476	500	506	18
53	147	252	546	84	89	149	370	1476	226	130	241	403	51	387	369	374	19
59	168	294	615	93	102	174	417	1475	223	116	244	417	43	382	364	369	20
67	189	336	686	106	115	199	467	1468	226	103	245	425	38	387	360	366	21
53	147	189	483	84	89	112	333	1452	251	145	268	336	102	430	438	444	22
59	168	231	552	93	102	137	380	1454	245	127	268	360	82	420	421	427	23
67	189	273	623	106	115	161	430	1449	246	112	267	375	70	421	409	415	24
53	147	147	441	84	89	87	308	1432	272	157	289	282	159	465	500	506	25
59	168	189	510	93	102	112	355	1437	262	136	287	315	122	449	471	477	26
67	189	231	581	106	115	137	405	1434	261	119	283	337	101	447	450	456	27
53	147	294	588	84	89	174	395	1489	212	122	226	440	30	363	334	339	28
59	168	357	678	93	102	211	454	1492	205	106	224	465	18	351	320	325	29
67	189	399	749	106	115	236	504	1485	210	96	227	468	16	359	322	327	30
53	147	231	525	84	89	137	357	1468	234	135	249	382	65	400	389	395	31
59	168	294	615	93	102	174	417	1475	223	116	244	417	43	382	364	369	32
67	189	336	686	106	115	199	467	1468	226	103	245	425	38	387	360	366	33
53	147	189	483	84	89	112	333	1452	251	145	268	336	102	430	438	444	34
59	168	252	573	93	102	149	392	1461	237	123	260	380	66	406	400	406	35
67	189	294	644	106	115	174	442	1456	239	109	259	393	58	409	392	397	36
53	126	189	462	84	76	112	320	1444	261	151	239	349	90	447	400	406	37
59	147	231	531	93	89	137	367	1447	254	131	243	372	72	434	389	395	38
67	168	273	602	106	102	161	417	1443	253	116	244	387	62	434	381	387	39
59	147	168	468	93	89	99	330	1419	282	146	270	301	137	483	467	473	41
67	168	210	539	106	102	124	380	1419	278	127	268	327	110	476	445	451	42
59	147	126	426	93	89	74	305	1397	305	158	292	244	216	523	539	545	44
67	168	168	497	106	102	99	355	1400	298	136	287	280	163	510	500	506	45
53	126	231	504	84	76	137	345	1462	242	140	222	396	56	415	353	359	46
59	147	273	573	93	89	161	392	1462	238	123	227	412	46	407	350	356	47
67	168	315	644	106	102	186	442	1457	239	109	230	421	40	409	348	354	48
53	126	168	441	84	76	99	307	1434	272	157	248	323	114	465	429	435	49
59	147	210	510	93	89	124	354	1438	262	136	251	350	89	449	412	418	50
67	168	252	581	106	102	149	405	1435	261	119	252	368	75	447	400	406	51
59	147	168	468	93	89	99	330	1419	282	146	270	301	137	483	467	473	53
67	168	210	539	106	102	124	380	1419	278	127	268	327	110	476	445	451	54
53	126	273	546	84	76	161	370	1477	226	130	207	437	32	387	316	321	55
59	147	315	615	93	89	186	417	1476	223	116	214	447	26	382	318	324	56

STANDARD MIXES CP 114 AS ONE POCKET MIXES

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
67	168	357	686	106	102	211	467	1469	226	103	218	452	24	388	320	325	57
53	126	210	483	84	76	124	332	1453	252	145	230	374	71	431	375	381	58
59	147	252	552	93	89	149	379	1455	245	127	235	393	58	420	369	374	59
67	168	294	623	106	102	174	429	1450	246	112	237	405	50	421	364	369	60
53	126	168	441	84	76	99	307	1434	272	157	248	323	114	465	429	435	61
59	147	210	510	93	89	124	354	1438	262	136	251	350	89	449	412	418	62
67	168	252	581	106	102	149	405	1435	261	119	252	368	75	447	400	406	63
53	126	315	588	84	76	186	394	1490	212	122	194	472	14	363	286	291	64
59	147	378	678	93	89	223	454	1493	205	106	196	492	5	351	280	285	65
67	168	420	749	106	102	248	504	1485	210	96	202	493	-5	359	286	291	66
53	126	252	525	84	76	149	357	1469	234	135	214	417	43	401	334	339	67
59	147	315	615	93	89	186	417	1476	223	116	214	447	26	382	318	324	68
67	168	357	686	106	102	211	467	1469	226	103	218	452	24	388	320	325	69
53	126	210	483	84	76	124	332	1453	252	145	230	374	71	431	375	381	70
59	147	273	573	93	89	161	392	1462	238	123	227	412	46	407	350	356	71
67	168	315	644	106	102	186	442	1457	239	109	230	421	40	409	348	354	72
53	105	210	462	84	64	124	320	1445	262	151	199	389	61	448	334	339	73
59	126	252	531	93	76	149	367	1448	254	131	208	406	49	455	334	339	74
67	147	294	602	106	89	174	417	1444	254	115	214	417	43	434	334	339	75
59	126	189	468	93	76	112	329	1421	282	146	232	339	99	484	400	406	77
67	147	231	539	106	89	137	380	1420	278	127	235	360	82	477	389	395	78
59	126	147	426	93	76	87	305	1399	306	158	251	285	155	523	462	468	80
67	147	189	497	106	89	112	355	1401	298	136	251	315	122	510	438	444	81
53	105	252	504	84	64	149	344	1463	243	140	185	433	34	415	294	299	82
59	126	294	573	93	76	174	391	1463	238	123	195	444	28	407	300	305	83
67	147	336	644	106	89	199	442	1458	239	109	202	450	25	410	305	310	84
53	105	189	441	84	64	112	307	1435	272	157	207	364	78	466	357	363	85
59	126	231	510	93	76	137	354	1439	263	136	216	386	63	450	353	359	86
67	147	273	581	106	89	161	404	1436	261	119	220	399	54	447	350	356	87
59	126	189	468	93	76	112	329	1421	282	146	232	339	99	484	400	406	89
67	147	231	539	106	89	137	380	1420	278	127	235	360	82	477	389	395	90
53	105	294	546	84	64	174	369	1478	226	131	172	471	15	388	263	268	91
59	126	336	615	93	76	199	416	1477	224	116	183	477	12	383	273	278	92
67	147	378	686	106	89	223	466	1470	227	103	191	479	11	388	280	285	93
53	105	231	483	84	64	137	332	1454	252	145	192	411	46	431	313	318	94
59	126	273	552	93	76	161	379	1456	245	127	201	426	38	420	316	321	95
67	147	315	623	106	89	186	429	1451	246	112	208	434	33	421	318	324	96
53	105	189	441	84	64	112	307	1435	272	157	207	364	78	466	357	363	97
59	126	231	510	93	76	137	354	1439	263	136	216	386	63	450	353	359	98
67	147	273	581	106	89	161	404	1436	261	119	220	399	54	447	350	356	99
53	105	336	588	84	64	199	394	1491	212	122	161	504	0	363	238	243	100
59	126	399	678	93	76	236	453	1494	205	106	168	520	- 6	351	240	245	101
67	147	441	749	106	89	261	504	1486	210	96	177	518	- 5	359	250	255	102
53	105	273	525	84	64	161	357	1471	234	135	178	452	24	401	278	283	103
59	126	336	615	93	76	199	416	1477	224	116	183	477	12	383	273	278	104
67	147	378	686	106	89	223	466	1470	227	103	191	479	11	388	280	285	105
53	105	231	483	84	64	137	332	1454	252	145	192	411	46	431	313	318	106
59	126	294	573	93	76	174	391	1463	238	123	195	444	28	407	300	305	107
67	147	336	644	106	89	199	442	1458	239	109	202	450	25	410	305	310	108
53	147	147	441	84	89	87	308	1432	272	157	289	282	159	465	500	506	109

STANDARD MIXES CP 114 AS ONE POCKET MIXES

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
59	168	189	510	93	102	112	355	1437	262	136	287	315	122	449	471	477	110
67	189	231	581	106	115	137	405	1434	261	119	283	337	101	447	450	456	111
59	168	126	447	93	102	74	318	1407	293	152	321	235	233	502	572	578	113
67	189	168	518	106	115	99	368	1408	287	131	312	270	176	492	530	536	114
59	168	84	405	93	102	50	293	1383	318	165	348	170	400	544	667	672	116
67	189	126	476	106	115	74	343	1388	308	141	334	217	268	528	600	606	117
53	147	189	483	84	89	112	333	1452	251	145	268	336	102	430	438	444	118
59	168	231	552	93	102	137	380	1453	245	127	268	360	82	420	421	427	119
67	189	273	623	106	115	161	430	1449	246	112	267	375	70	421	409	415	120
53	147	126	420	84	89	74	295	1422	283	163	302	252	203	485	539	545	121
59	168	168	489	93	102	99	342	1428	272	141	297	290	150	465	500	506	122
67	189	210	560	106	115	124	393	1426	269	123	292	316	121	461	474	480	123
59	168	126	447	93	102	74	318	1407	293	152	321	235	233	502	572	578	125
67	189	168	518	106	115	99	368	1408	287	131	312	270	176	492	530	536	126
53	147	231	525	84	89	137	357	1468	234	135	249	382	65	400	389	395	127
59	168	273	594	93	102	161	404	1468	230	119	252	399	54	394	381	387	128
67	189	315	665	106	115	186	455	1462	232	106	252	410	47	398	375	381	129
53	147	168	462	84	89	99	320	1442	261	151	278	310	127	447	467	473	130
59	168	210	531	93	102	124	367	1446	253	131	277	338	100	434	445	451	131
67	189	252	602	106	115	149	417	1442	253	115	274	357	84	433	429	435	132
53	147	126	420	84	89	74	295	1422	283	163	302	252	203	485	539	545	133
59	168	168	489	93	102	99	342	1428	272	141	297	290	150	465	500	506	134
67	189	210	560	106	115	124	393	1426	269	123	292	316	121	461	474	480	135
53	147	273	567	84	89	161	382	1483	219	126	233	422	40	374	350	356	136
59	168	336	657	93	102	199	442	1487	211	109	231	450	25	361	334	339	137
67	189	378	728	106	115	223	492	1479	215	98	233	454	23	368	334	339	138
53	147	210	504	84	89	124	345	1460	242	140	258	360	82	415	412	418	139
59	168	273	594	93	102	161	404	1468	230	119	252	399	54	394	381	387	140
67	189	315	665	106	115	186	455	1462	232	106	252	410	47	398	375	381	141
53	147	168	462	84	89	99	320	1442	261	151	278	310	127	447	467	473	142
59	168	231	552	93	102	137	380	1453	245	127	268	360	82	420	421	427	143
67	189	273	623	106	115	161	430	1449	246	112	267	375	70	421	409	415	144
53	126	168	441	84	76	99	307	1434	272	157	248	323	114	465	429	435	145
59	147	210	510	93	89	124	354	1438	262	136	251	350	89	449	412	418	146
67	168	252	581	106	102	149	405	1435	261	119	252	368	75	447	400	406	147
59	147	147	447	93	89	87	317	1409	293	152	281	274	170	502	500	506	149
67	168	189	518	106	102	112	367	1409	288	131	277	304	134	492	471	477	150
59	147	105	405	93	89	62	292	1385	318	165	305	212	279	545	584	589	152
67	168	147	476	106	102	87	343	1389	308	141	297	254	200	528	534	540	153
53	126	210	483	84	76	124	332	1453	252	145	230	374	71	431	375	381	154
59	147	252	552	93	89	149	379	1455	245	127	235	393	58	420	369	374	155
67	168	294	623	106	102	174	429	1450	246	112	237	405	50	421	364	369	156
53	126	147	420	84	76	87	295	1423	283	163	259	295	144	485	462	468	157
59	147	189	489	93	89	112	342	1429	272	141	260	327	110	466	438	444	158
67	168	231	560	106	102	137	392	1427	269	123	260	348	91	461	421	427	159
59	147	147	447	93	89	87	317	1409	293	152	281	274	170	502	500	506	161
67	168	189	518	106	102	112	367	1409	288	131	277	304	134	492	471	477	162
53	126	252	525	84	76	149	357	1469	234	135	214	417	43	401	334	339	163
59	147	294	594	93	89	174	404	1469	230	119	220	430	35	394	334	339	164
67	168	336	665	106	102	199	454	1463	233	106	224	437	31	398	334	339	165

STANDARD MIXES OP 114 AS ONE POCKET MIXES

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
53	126	189	462	84	76	112	320	1444	261	151	239	349	90	447	400	406	166
59	147	231	531	93	89	137	367	1447	254	131	243	372	72	434	389	395	167
67	168	273	602	106	102	161	417	1443	253	116	244	387	62	434	381	387	168
53	126	147	420	84	76	87	295	1423	283	163	259	295	144	485	462	468	169
59	147	189	489	93	89	112	342	1429	272	141	260	327	110	466	438	444	170
67	168	231	560	106	102	137	392	1427	269	123	260	348	91	461	421	427	171
53	126	294	567	84	76	174	382	1484	219	126	200	455	22	375	300	305	172
59	147	357	657	93	89	211	441	1488	211	109	202	476	11	361	292	297	173
67	168	399	728	106	102	236	492	1480	215	98	207	480	11	368	296	302	174
53	126	231	504	84	76	137	345	1461	242	140	222	396	56	415	353	359	175
59	147	294	594	93	89	174	404	1469	230	119	220	430	35	394	334	339	176
67	168	336	665	106	102	199	454	1463	233	106	224	437	31	398	334	339	177
53	126	189	462	84	76	112	320	1444	261	151	239	349	90	447	400	406	178
59	147	252	552	93	89	149	379	1455	245	127	235	393	58	420	369	374	179
67	168	294	623	106	102	174	429	1450	246	112	237	405	50	421	364	369	180
53	105	189	441	84	64	112	307	1435	272	157	207	364	78	466	357	363	181
59	126	231	510	93	76	137	354	1439	263	136	216	386	63	450	353	359	182
67	147	273	581	106	89	161	404	1436	261	119	220	399	54	447	350	356	183
59	126	168	447	93	76	99	317	1410	294	152	241	313	124	503	429	435	185
67	147	210	518	106	89	124	367	1411	288	131	243	338	100	493	412	418	186
59	126	126	405	93	76	74	292	1386	319	165	261	255	198	545	500	506	188
67	147	168	476	106	89	99	342	1390	309	141	260	290	150	529	467	473	189
53	105	231	483	84	64	137	332	1454	252	145	192	411	46	431	313	318	190
59	126	273	552	93	76	161	379	1456	245	127	201	426	38	420	316	321	191
67	147	315	623	106	89	186	429	1451	246	112	208	434	33	422	318	324	192
53	105	168	420	84	64	99	295	1424	284	164	216	337	101	486	385	391	193
59	126	210	489	93	76	124	342	1430	272	141	223	363	79	466	375	381	194
67	147	252	560	106	89	149	392	1428	270	123	227	380	66	462	369	374	195
59	126	168	447	93	76	99	317	1410	294	152	241	313	124	503	429	435	197
67	147	210	518	106	89	124	367	1411	288	131	243	338	100	493	412	418	198
53	105	273	525	84	64	161	357	1471	234	135	178	452	24	401	278	283	199
59	126	315	594	93	76	186	404	1470	230	119	189	461	19	394	286	291	200
67	147	357	665	106	89	211	454	1464	233	106	196	465	17	398	292	297	201
53	105	210	462	84	64	124	320	1445	262	151	199	388	61	448	334	339	202
59	126	252	531	93	76	149	367	1448	254	131	208	406	49	435	334	339	203
67	147	294	602	106	89	174	417	1444	254	116	214	417	43	434	334	339	204
53	105	168	420	84	64	99	295	1424	284	164	216	337	101	486	365	391	205
59	126	210	489	93	76	124	342	1430	272	141	223	363	79	466	375	381	206
67	147	252	560	106	89	149	392	1428	270	123	227	380	66	462	369	374	207
53	105	315	567	84	64	186	382	1485	219	126	167	488	7	375	250	255	208
59	126	378	657	93	76	223	441	1489	211	109	173	507	1	361	250	255	209
67	147	420	728	106	89	248	491	1481	215	98	181	505	0	368	259	264	210
53	105	252	504	84	64	149	344	1463	243	140	185	433	34	416	294	299	211
59	126	315	594	93	76	186	404	1470	230	119	189	461	19	394	286	291	212
67	147	357	665	106	89	211	454	1464	233	106	196	465	17	398	292	297	213
53	105	210	462	84	64	124	320	1445	262	151	199	388	61	448	334	339	214
59	126	273	552	93	76	161	379	1456	245	127	201	426	38	420	316	321	215
67	147	315	623	106	89	186	429	1451	246	112	208	434	33	422	318	324	216

STANDARD MIXES OF 114 W/C AND A/C

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
1	56	335	2	63	402	3	71	469	4	0	0	5	63	335	6	71	402
7	0	0	8	63	290	9	71	357	10	56	380	11	63	447	12	71	514
13	56	313	14	63	380	15	71	447	16	0	0	17	63	335	18	71	402
19	56	424	20	63	491	21	71	558	22	56	357	23	63	424	24	71	491
25	56	313	26	63	380	27	71	447	28	56	469	29	63	558	30	71	625
31	56	402	32	63	491	33	71	558	34	56	357	35	63	447	36	71	514
37	56	335	38	63	402	39	71	469	40	0	0	41	63	335	42	71	402
43	0	0	44	63	290	45	71	357	46	56	380	47	63	447	48	71	514
49	56	313	50	63	380	51	71	447	52	0	0	53	63	335	54	71	402
55	56	424	56	63	491	57	71	558	58	56	357	59	63	424	60	71	491
61	56	313	62	63	380	63	71	447	64	56	469	65	63	558	66	71	625
67	56	402	68	63	491	69	71	558	70	56	357	71	63	447	72	71	514
73	56	335	74	63	402	75	71	469	76	0	0	77	63	335	78	71	402
79	0	0	80	63	290	81	71	357	82	56	380	83	63	447	84	71	514
85	56	313	86	63	380	87	71	447	88	0	0	89	63	335	90	71	402
91	56	424	92	63	491	93	71	558	94	56	357	95	63	424	96	71	491
97	56	313	98	63	380	99	71	447	100	56	469	101	63	558	102	71	625
103	56	402	104	63	491	105	71	558	106	56	357	107	63	447	108	71	514
109	56	313	110	63	380	111	71	447	112	0	0	113	63	313	114	71	380
115	0	0	116	63	268	117	71	335	118	56	357	119	63	424	120	71	491
121	56	290	122	63	357	123	71	424	124	0	0	125	63	313	126	71	380
127	56	402	128	63	469	129	71	536	130	56	335	131	63	402	132	71	469
133	56	290	134	63	357	135	71	424	136	56	446	137	63	536	138	71	603
139	56	380	140	63	469	141	71	536	142	56	335	143	63	424	144	71	491
145	56	313	146	63	380	147	71	447	148	0	0	149	63	313	150	71	380
151	0	0	152	63	268	153	71	335	154	56	357	155	63	424	156	71	491
157	56	290	158	63	357	159	71	424	160	0	0	161	63	313	162	71	380
163	56	402	164	63	469	165	71	536	166	56	335	167	63	402	168	71	469
169	56	290	170	63	357	171	71	424	172	56	446	173	63	536	174	71	603
175	56	380	176	63	469	177	71	536	178	56	335	179	63	424	180	71	491
181	56	313	182	63	380	183	71	447	184	0	0	185	63	313	186	71	380
187	0	0	188	63	268	189	71	335	190	56	357	191	63	424	192	71	491
193	56	290	194	63	357	195	71	424	196	0	0	197	63	313	198	71	380
199	56	402	200	63	469	201	71	536	202	56	335	203	63	402	204	71	469
205	56	290	206	63	357	207	71	424	208	56	446	209	63	536	210	71	603
211	56	380	212	63	469	213	71	536	214	56	335	215	63	424	216	71	491

STANDARD MIXES CP 114 DA/A/0.01 CHANGE IN CF
DA/A/ONE INCH CHANGE IN SLUMP

668

ZONE 1 NATURAL SAND

CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J
0	0	0	0	1	278	333	333	400	2	238	278	286	333	3
0	0	0	0	4	242	280	152	176	5	202	227	127	143	6
294	357	282	343	10	250	294	240	282	11	217	250	209	240	12
0	0	0	0	13	235	267	72	82	14	200	222	62	68	15
263	312	210	250	19	227	263	182	210	20	200	227	160	182	21
278	317	62	71	22	234	261	53	59	23	202	222	45	50	24
238	278	95	111	28	200	227	80	91	29	179	200	71	80	30
247	278	44	50	31	202	222	36	40	32	178	193	32	35	33

ZONE 2 NATURAL SAND

CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J
0	0	0	0	37	278	333	333	400	38	238	278	286	333	39
0	0	0	0	40	242	280	152	176	41	202	227	127	143	42
294	357	282	343	46	250	294	240	282	47	217	250	209	240	48
0	0	0	0	49	235	267	72	82	50	200	222	62	68	51
263	312	210	250	55	227	263	182	210	56	200	227	160	182	57
278	317	62	71	58	234	261	53	59	59	202	222	45	50	60
238	278	95	111	64	200	227	80	91	65	179	200	71	80	66
247	276	44	50	67	202	222	36	40	68	178	193	32	35	69

ZONE 3 NATURAL SAND

CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J
0	0	0	0	73	278	333	333	400	74	238	278	286	333	75
0	0	0	0	76	242	280	152	176	77	202	227	127	143	78
294	357	282	343	82	250	294	240	282	83	217	250	209	240	84
0	0	0	0	85	235	267	72	82	86	200	222	62	68	87
263	312	210	250	91	227	263	182	210	92	200	227	160	182	93
278	317	62	71	94	234	261	53	59	95	202	222	45	50	96
238	278	95	111	100	200	227	80	91	101	179	200	71	80	102
247	278	44	50	103	202	222	36	40	104	176	193	32	35	105

STANDARD MIXES CP 114 DA/A/0.01 CHANGE IN CF
DA/A/ONE INCH CHANGE IN SLUMP

ZONE 1 CRUSHED SAND

CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J
0	0	0	0	109	294	357	353	428	110	250	294	300	353	111
0	0	0	0	112	260	303	163	190	113	214	242	134	152	114
312	384	300	369	118	263	312	253	300	119	227	263	218	253	120
0	0	0	0	121	250	286	77	88	122	210	235	65	72	123
278	333	222	267	127	238	278	190	222	128	208	238	167	190	129
296	342	67	77	130	247	278	56	62	131	212	234	48	53	132
250	294	100	118	136	208	238	83	95	137	185	208	74	83	138
261	296	47	53	139	212	234	38	42	140	185	202	33	36	141

ZONE 2 CRUSHED SAND

CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J	CF. UP	CF. DOWN	SL UP	SL DOWN	J
0	0	0	0	145	294	357	353	428	146	250	294	300	353	147
0	0	0	0	148	260	303	163	190	149	214	242	134	152	150
312	384	300	369	154	263	312	253	300	155	227	263	218	253	156
0	0	0	0	157	250	286	77	88	158	210	235	65	72	159
278	333	222	267	163	238	278	190	222	164	208	238	167	190	165
296	342	67	77	166	247	278	56	62	167	212	234	48	53	168
250	294	100	118	172	208	238	83	95	173	185	208	74	83	174
261	296	47	53	175	212	234	38	42	176	185	202	33	36	177

ZONE 3 CRUSHED SAND

CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J	CF UP	CF DOWN	SL UP	SL DOWN	J
0	0	0	0	181	294	357	353	428	182	250	294	300	353	183
0	0	0	0	184	260	303	163	190	185	214	242	134	152	186
312	384	300	369	190	263	312	253	300	191	227	263	218	253	192
0	0	0	0	193	250	286	77	88	194	210	235	65	72	195
278	333	222	267	199	238	278	190	222	200	208	238	167	190	201
296	342	67	77	202	247	278	56	62	203	212	234	48	53	204
250	294	100	118	208	208	238	83	95	209	185	208	74	83	210
261	296	47	53	211	212	234	38	42	212	185	202	33	36	213

IDENTIFICATION OF ROAD NOTE NO.4 MIXES

Grading No. of Aggregate **	Workability *	J for 3/4" Max. Stone	J for 1-1/2" Max. Stone
(4)	VL	1 - 7	120 - 124
	L	8 - 16	125 - 131
	M	17 - 28	132 - 139
	H	29 - 41	140 - 148
(3)	VL	42 - 47	149 - 153
	L	48 - 55	154 - 158
	M	56 - 66	159 - 165
	H	67 - 75	166 - 172
(2)	VL	76 - 81	173 - 176
	L	82 - 89	177 - 181
	M	90 - 95	182 - 187
	H	96 - 99	188 - 191
(1)	VL	100 - 105	192 - 195
	L	106 - 113	196 - 200
	M	114 - 117	201 - 204
	H	118 - 119	205 - 206

* VL = very low L = low M = medium H = high

** The grading indicated by these numbers is different as the maximum size of stone changes from 3/4 inch to 1-1/2 inch.

7812

ROAD NOTE 4 W/C AND A/C

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
1	35	300	2	40	400	3	45	480	4	50	560	5	55	645	6	60	715
7	65	775	8	35	265	9	40	340	10	45	415	11	50	480	12	55	540
13	60	600	14	65	655	15	70	705	16	75	755	17	35	235	18	40	300
19	45	360	20	50	430	21	55	485	22	60	535	23	65	580	24	70	625
25	75	670	26	80	710	27	85	745	28	90	775	29	35	225	30	40	285
31	45	340	32	50	400	33	55	450	34	60	500	35	65	545	36	70	585
37	75	625	38	80	665	39	85	700	40	90	735	41	95	765	42	35	335
43	40	430	44	45	525	45	50	605	46	55	690	47	60	765	48	35	285
49	40	365	50	45	445	51	50	510	52	55	575	53	60	630	54	65	695
55	70	745	56	35	250	57	40	320	58	45	385	59	50	445	60	55	510
61	60	555	62	65	605	63	70	655	64	75	695	65	80	735	66	85	765
67	35	235	68	40	300	69	45	360	70	50	420	71	55	470	72	60	520
73	65	565	74	70	605	75	75	645	76	35	350	77	40	460	78	45	565
79	50	655	80	55	740	81	60	825	82	35	295	83	40	395	84	45	470
85	50	535	86	55	600	87	60	665	88	65	725	89	70	775	90	35	265
91	40	335	92	45	405	93	50	470	94	55	520	95	60	570	96	35	245
97	40	315	98	45	375	99	50	440	100	35	360	101	40	480	102	45	595
103	50	705	104	55	800	105	60	885	106	35	300	107	40	400	108	45	480
109	50	545	110	55	610	111	60	685	112	65	740	113	70	795	114	35	265
115	40	335	116	45	405	117	50	470	118	35	245	119	40	315	120	35	285
121	40	370	122	45	455	123	50	530	124	55	615	125	35	250	126	40	320
127	45	400	128	50	480	129	55	550	130	60	620	131	65	690	132	35	230
133	40	290	134	45	350	135	50	425	136	55	495	137	60	565	138	65	620
139	70	680	140	35	210	141	40	275	142	45	340	143	50	410	144	55	475
145	60	525	146	65	590	147	70	640	148	75	695	149	35	305	150	40	405
151	45	500	152	50	530	153	55	665	154	35	270	155	40	360	156	45	440
157	50	515	158	55	590	159	35	240	160	40	305	161	45	390	162	50	455
163	55	530	164	60	595	165	65	660	166	35	230	167	40	300	168	45	365
169	50	445	170	55	510	171	60	575	172	65	640	173	35	330	174	40	440
175	45	555	176	50	655	177	35	290	178	40	385	179	45	475	180	50	570
181	55	655	182	35	260	183	40	340	184	45	420	185	50	500	186	55	565
187	60	640	188	35	250	189	40	320	190	45	390	191	50	460	192	35	360
193	40	490	194	45	605	195	50	700	196	35	310	197	40	405	198	45	500
199	50	600	200	55	690	201	35	270	202	40	360	203	45	450	204	50	535

ONE POCKET MIXES ROAD NOTE 4

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
33	135	147	409	52	82	87	269	1521	193	179	305	323	114	330	480	486	1
38	180	196	508	59	109	115	333	1526	178	145	329	348	91	305	480	486	2
42	217	235	588	67	131	139	385	1526	173	125	341	361	81	297	480	486	3
47	253	274	667	74	153	162	437	1526	169	110	350	370	74	290	480	486	4
52	291	315	752	82	176	187	493	1526	165	98	358	379	67	285	480	486	5
56	323	349	823	89	196	207	539	1525	165	89	362	383	64	282	480	486	6
61	350	379	884	96	212	224	581	1522	166	83	365	386	62	284	480	486	7
33	120	130	376	52	72	77	249	1509	208	193	291	308	130	356	480	486	8
38	153	166	451	59	93	98	299	1510	198	161	311	329	108	340	480	486	9
42	187	203	526	67	113	120	348	1511	191	138	326	344	94	328	480	486	10
47	217	235	592	74	131	139	392	1509	189	123	335	354	86	323	480	486	11
52	244	264	653	82	148	156	434	1507	188	111	341	360	81	322	480	486	12
56	271	293	714	89	164	174	475	1505	187	102	346	366	77	321	480	486	13
61	296	320	771	96	179	189	513	1502	188	94	349	369	74	322	480	486	14
66	318	345	823	104	193	204	549	1499	189	88	351	372	73	324	480	486	15
71	341	369	874	111	206	218	584	1496	190	83	353	374	71	326	480	486	16
33	106	115	348	52	64	68	232	1497	223	207	277	293	147	382	480	486	17
38	135	147	414	59	82	87	276	1497	215	174	297	314	123	367	480	486	18
42	162	176	475	67	98	104	317	1495	210	152	310	328	109	360	480	486	19
47	194	210	545	74	118	124	364	1497	203	132	323	341	97	348	480	486	20
52	219	237	602	82	133	140	403	1494	202	120	329	348	91	347	480	486	21
56	241	262	653	89	146	155	438	1491	203	110	334	353	87	348	480	486	22
61	262	284	700	96	159	168	471	1487	205	102	337	356	84	350	480	486	23
66	282	306	747	104	171	181	504	1484	206	96	339	359	82	353	480	486	24
71	302	327	794	111	183	194	536	1481	207	90	342	361	80	355	480	486	25
75	320	347	837	119	194	205	566	1477	209	85	343	363	79	359	480	485	26
80	336	364	874	126	204	215	593	1473	212	81	343	363	79	364	480	486	27
85	350	379	907	133	212	224	618	1469	216	78	343	363	79	370	480	486	28
33	102	110	338	52	62	65	227	1493	229	213	271	287	153	392	480	485	29
38	129	139	400	59	78	82	268	1491	221	180	291	308	130	379	480	486	30
42	153	166	456	67	93	98	306	1489	218	157	304	321	116	373	480	486	31
47	180	196	517	74	109	116	347	1488	213	139	315	333	104	365	480	486	32
52	203	220	569	82	123	130	383	1485	213	126	321	340	98	365	480	486	33
56	226	244	620	89	137	145	418	1482	213	115	327	346	93	364	480	486	34
61	246	266	667	96	149	158	451	1479	214	107	330	349	90	366	480	486	35
66	264	286	710	104	160	169	481	1475	216	100	333	352	88	369	480	485	36
71	282	306	752	111	171	181	511	1471	218	94	334	354	86	372	480	486	37
75	300	325	794	119	182	192	541	1468	219	89	336	356	85	375	480	485	38
80	316	342	832	126	191	202	568	1464	222	85	337	356	84	380	480	486	39
85	332	359	870	133	201	213	595	1461	224	81	338	357	84	384	480	486	40
89	345	374	902	141	209	221	619	1457	227	78	338	357	84	389	480	486	41
33	132	183	442	52	80	108	288	1532	180	167	278	375	70	308	420	425	42
38	170	234	536	59	103	139	349	1535	170	138	295	397	55	291	420	426	43
42	207	286	630	67	126	169	410	1536	163	118	306	413	45	279	420	426	44
47	239	330	710	74	145	195	462	1535	160	104	313	422	40	275	420	426	45
52	272	376	794	82	165	223	517	1535	158	93	319	430	35	270	420	425	46
56	302	417	870	89	183	247	567	1534	157	85	323	435	32	269	420	426	47
33	113	155	395	52	68	92	260	1517	199	185	262	353	87	341	420	426	48
38	144	199	475	59	87	118	313	1519	190	154	279	377	69	325	420	425	49
42	176	243	555	67	106	144	365	1520	183	132	292	393	57	313	420	426	50

ONE POCKET MIXES ROAD NOTE 4

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
47	201	278	620	74	122	165	409	1517	181	118	298	402	52	310	420	426	51
52	227	313	686	82	138	185	453	1515	180	106	304	410	47	308	420	426	52
56	249	343	743	89	151	203	491	1512	181	98	307	414	45	310	420	426	53
61	274	379	808	96	166	224	535	1511	180	90	311	419	41	308	420	426	54
66	294	406	860	104	178	240	571	1507	182	84	312	421	40	311	420	426	55
33	99	136	362	52	60	81	241	1504	216	200	249	335	102	369	420	426	56
38	126	174	432	59	77	103	287	1505	206	168	267	359	82	353	420	426	57
42	152	210	498	67	92	124	331	1504	201	146	278	375	70	345	420	426	58
47	176	243	559	74	106	144	372	1502	199	129	286	386	63	341	420	426	59
52	201	278	625	82	122	165	416	1502	196	116	293	395	56	335	420	426	60
56	219	303	672	89	133	179	449	1497	198	107	296	399	54	339	420	426	61
61	239	330	724	96	145	195	484	1494	199	99	299	403	51	340	420	426	62
66	259	357	776	104	157	211	520	1491	200	93	301	406	49	342	420	425	63
71	274	379	818	111	166	224	550	1487	202	88	302	408	48	346	420	426	64
75	290	401	860	119	176	237	580	1484	205	83	303	409	47	350	420	426	65
80	302	417	893	126	183	247	604	1478	209	80	303	409	48	357	420	426	66
33	93	128	348	52	56	76	232	1498	224	208	242	327	110	383	420	426	67
38	118	164	414	59	72	97	276	1498	215	175	260	351	89	368	420	426	68
42	142	196	475	67	86	116	317	1497	210	152	272	366	77	360	420	426	69
47	166	229	536	74	101	135	358	1495	207	135	280	378	68	354	420	426	70
52	186	256	588	82	112	152	394	1492	207	122	286	385	63	354	420	426	71
56	205	284	639	89	124	168	429	1489	207	112	290	391	59	355	420	426	72
61	223	308	686	96	135	182	462	1485	209	104	293	394	57	357	420	426	73
66	239	330	729	104	145	195	492	1481	211	98	294	397	55	361	420	426	74
71	255	352	771	111	154	208	522	1477	213	92	296	399	54	365	420	426	75
33	115	214	456	52	70	127	296	1538	175	163	235	427	37	300	350	355	76
38	151	281	564	59	92	166	366	1543	162	132	251	455	22	278	350	355	77
42	186	345	567	67	113	204	432	1545	154	112	261	473	14	264	350	355	78
47	215	400	757	74	131	237	490	1545	151	98	267	484	9	259	350	355	79
52	243	452	841	82	148	268	545	1544	150	88	271	491	6	256	350	355	80
56	271	504	926	89	165	298	600	1543	148	80	274	497	3	254	350	355	81
33	97	180	404	52	59	107	266	1522	195	182	222	402	52	335	350	355	82
38	130	241	503	59	79	143	329	1528	180	146	239	434	33	309	350	355	83
42	155	287	578	67	94	170	379	1527	176	127	248	449	25	302	350	355	84
47	176	327	644	74	107	193	422	1524	175	114	253	458	21	300	350	355	85
52	197	367	710	82	120	217	466	1522	175	103	257	465	17	299	350	355	86
56	219	406	776	89	133	240	510	1520	174	94	260	471	14	298	350	355	87
61	239	443	837	96	145	262	551	1518	175	87	262	475	13	299	350	355	88
66	255	474	888	104	155	280	587	1514	177	82	263	478	12	303	350	355	89
33	87	162	376	52	53	96	249	1512	209	194	212	385	63	357	350	355	90
38	110	205	447	59	67	121	295	1511	201	163	226	410	47	344	350	355	91
42	133	247	517	67	81	146	342	1511	195	141	236	428	36	334	350	355	92
47	155	287	583	74	94	170	386	1510	192	125	243	440	30	329	350	355	93
52	171	318	635	82	104	188	421	1506	193	114	246	446	27	331	350	355	94
56	188	348	686	89	114	206	457	1502	195	105	249	451	24	333	350	355	95
33	81	150	357	52	49	89	238	1504	218	203	206	373	72	374	350	355	96
38	104	192	428	59	63	114	284	1505	209	170	221	401	53	357	350	355	97
42	123	229	489	67	75	136	325	1503	205	148	230	417	43	351	350	355	98
47	145	269	555	74	88	159	369	1502	201	131	238	431	35	344	350	355	99
33	102	237	465	52	62	140	302	1542	172	160	204	464	18	294	300	305	100

ONE POCKET MIXES ROAD NOTE 4

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
38	135	316	583	59	82	187	376	1548	158	128	218	496	3	270	300	305	101
42	168	392	696	67	102	232	448	1552	149	108	227	517	- 5	255	300	305	102
47	199	464	804	74	120	274	517	1554	143	93	233	531	- 10	245	300	305	103
52	226	526	898	82	137	311	578	1553	141	83	237	539	- 13	242	300	305	104
56	250	582	982	89	151	345	633	1552	141	76	239	544	- 15	241	300	305	105
33	85	197	409	52	51	117	268	1525	193	180	191	436	32	331	300	305	106
38	113	263	508	59	68	156	332	1531	179	145	206	470	15	306	300	305	107
42	135	316	588	67	82	187	384	1531	174	126	214	487	8	298	300	305	108
47	154	359	653	74	93	212	428	1528	173	113	218	496	4	297	300	305	109
52	172	401	719	82	104	237	471	1525	173	102	221	504	1	296	300	305	110
56	193	451	794	89	117	267	521	1525	171	93	225	512	- 3	292	300	305	111
61	209	487	851	96	126	288	559	1521	172	86	226	515	- 4	295	300	305	112
66	224	523	907	104	136	310	597	1518	174	81	227	518	- 5	297	300	305	113
33	75	174	376	52	45	103	249	1513	209	194	182	415	44	357	300	305	114
38	94	220	447	59	57	130	295	1513	201	163	194	442	29	344	300	305	115
42	114	266	517	67	69	158	342	1513	195	141	203	461	19	334	300	305	116
47	133	309	583	74	80	183	386	1511	192	125	208	475	13	329	300	305	117
33	69	161	357	52	42	95	237	1505	219	203	176	402	52	374	300	305	118
38	89	207	428	59	54	123	284	1506	209	170	190	432	34	357	300	305	119
33	126	142	395	52	76	84	260	1516	199	185	293	323	114	341	470	476	120
38	163	184	479	59	99	109	316	1519	188	153	314	346	93	322	470	476	121
42	201	227	564	67	122	134	371	1521	180	130	329	362	80	308	470	476	122
47	234	264	639	74	142	156	420	1520	176	115	338	372	73	302	470	476	123
52	272	306	724	82	165	181	476	1522	171	101	346	381	66	293	470	476	124
33	110	125	362	52	67	74	241	1503	216	200	278	306	131	369	470	476	125
38	141	159	432	59	86	94	288	1504	206	168	298	328	109	353	470	476	126
42	177	199	512	67	107	118	340	1507	196	142	315	347	92	336	470	476	127
47	212	239	592	74	129	141	392	1509	189	123	328	361	81	323	470	476	128
52	243	274	663	82	147	162	439	1509	186	110	335	369	74	318	470	476	129
56	274	309	733	89	166	183	486	1509	183	99	342	376	69	313	470	476	130
61	305	344	804	96	185	203	533	1509	181	90	347	382	65	310	470	476	131
33	102	115	343	52	62	68	229	1495	226	210	268	295	143	387	470	476	132
38	128	144	404	59	78	85	271	1494	219	178	287	316	121	375	470	476	133
42	159	179	475	67	96	106	317	1495	210	152	304	334	103	360	470	476	134
47	188	212	541	74	114	125	361	1496	205	133	315	347	92	351	470	476	135
52	219	247	611	82	133	146	408	1497	200	118	325	357	83	342	470	476	136
56	250	281	682	89	151	167	455	1498	195	106	333	366	77	335	470	476	137
61	274	309	738	96	166	183	493	1496	195	98	337	370	73	334	470	476	138
66	300	339	799	104	182	200	535	1495	194	90	341	375	70	332	470	476	139
33	93	105	324	52	56	62	218	1486	238	221	258	284	158	407	470	476	140
38	121	137	390	59	74	81	262	1488	226	184	281	309	128	387	470	476	141
42	150	169	456	67	91	100	306	1489	218	157	297	327	110	373	470	476	142
47	181	204	526	74	110	121	353	1491	210	137	311	342	96	360	470	476	143
52	210	237	592	82	127	140	397	1492	205	121	320	353	87	352	470	476	144
56	232	262	644	89	141	155	432	1489	206	111	325	358	83	352	470	476	145
61	261	294	710	96	158	174	476	1490	202	101	332	365	78	346	470	476	146
66	283	319	761	104	171	189	512	1487	203	94	335	368	75	347	470	476	147
71	307	346	818	111	186	205	550	1486	202	86	338	372	72	346	470	476	148
33	115	172	414	52	70	102	271	1524	191	178	256	375	70	327	400	406	149
38	152	228	512	59	92	135	335	1529	177	144	276	404	51	303	400	406	150

ONE POCKET MIXES ROAD NOTE 4

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
42	188	282	606	67	114	167	395	1532	169	122	288	422	40	289	400	405	151
47	218	327	586	74	132	194	448	1532	165	108	295	432	34	283	400	406	152
52	250	375	771	82	152	222	503	1532	162	96	301	441	29	277	400	406	153
33	102	152	381	52	62	90	252	1512	206	191	244	358	83	353	400	406	154
38	135	203	470	59	82	120	310	1518	191	156	265	388	61	328	400	405	155
42	165	248	550	67	100	147	362	1519	184	133	277	406	50	315	400	406	156
47	194	290	625	74	117	172	412	1519	180	117	285	418	42	308	400	406	157
52	222	333	700	82	134	197	461	1519	177	105	292	427	37	303	400	406	158
33	90	135	353	52	55	80	235	1501	221	205	233	341	97	378	400	406	159
38	115	172	418	59	70	102	279	1500	213	173	249	365	77	364	400	406	160
42	147	220	503	67	89	130	334	1506	200	144	266	390	60	342	400	406	161
47	171	257	569	74	104	152	378	1505	196	128	274	402	52	336	400	405	162
52	199	299	544	82	121	177	427	1507	191	113	283	414	45	327	400	406	163
56	224	336	710	89	136	199	471	1505	189	102	288	421	40	323	400	406	164
61	248	372	776	96	150	220	515	1505	187	94	292	427	37	320	400	406	165
33	86	130	343	52	52	77	229	1497	226	210	229	335	103	387	400	406	166
38	113	169	414	59	68	100	276	1499	215	175	248	363	79	368	400	406	167
42	137	206	479	67	83	122	320	1499	209	151	260	381	66	357	400	405	168
47	167	251	559	74	101	149	372	1503	199	129	272	399	54	341	400	406	169
52	192	288	625	82	116	170	416	1502	196	116	279	409	47	335	400	406	170
56	216	324	591	89	131	192	460	1502	193	105	285	417	43	331	400	406	171
61	241	361	757	96	146	214	504	1501	191	96	289	424	39	327	400	406	172
33	99	211	437	52	60	125	285	1533	182	169	211	438	31	312	320	325	173
38	132	281	545	59	80	166	354	1540	167	136	227	470	15	287	320	325	174
42	167	355	658	67	101	210	426	1545	157	113	238	493	5	268	320	325	175
47	197	419	757	74	119	248	489	1546	151	98	244	506	0	259	320	325	176
33	87	185	400	52	53	110	263	1521	198	184	201	418	42	338	320	325	177
38	116	246	494	59	70	146	323	1526	183	149	217	450	25	314	320	325	178
42	143	304	583	67	87	180	381	1529	175	126	227	471	14	300	320	325	179
47	171	364	677	74	104	216	442	1532	168	109	235	488	7	287	320	325	180
52	197	419	761	82	119	248	497	1532	164	97	240	499	3	281	320	325	181
33	78	166	371	52	47	98	246	1510	211	196	193	400	53	361	320	325	182
38	102	217	451	59	62	129	298	1514	199	162	208	431	34	341	320	325	183
42	126	268	531	67	77	159	350	1516	190	138	219	453	23	326	320	325	184
47	150	320	611	74	91	189	403	1518	184	120	226	470	15	315	320	325	185
52	170	361	677	82	103	214	445	1516	183	108	231	479	11	313	320	325	186
56	193	409	752	89	117	242	496	1516	179	97	235	488	7	307	320	325	187
33	75	160	362	52	46	95	240	1507	216	201	190	394	57	370	320	325	188
38	96	205	432	59	58	121	287	1507	207	168	203	422	40	354	320	325	189
42	117	249	503	67	71	148	334	1508	200	145	213	442	29	342	320	325	190
47	138	294	573	74	84	174	380	1508	195	127	221	458	21	334	320	325	191
33	81	257	465	52	49	152	301	1543	172	160	163	505	0	295	240	244	192
38	111	350	592	59	67	207	382	1552	155	126	176	543	-14	266	240	244	193
42	136	432	705	67	83	256	453	1555	147	106	182	564	-21	252	240	244	194
47	158	500	799	74	96	296	514	1555	144	94	186	576	-25	247	240	244	195
33	70	221	418	52	42	131	274	1529	190	176	155	479	11	325	240	244	196
38	91	289	512	59	55	171	334	1534	177	144	166	512	-3	304	240	244	197
42	113	357	606	67	68	211	395	1536	169	122	173	536	-12	289	240	244	198
47	135	429	705	74	82	254	458	1539	162	105	179	554	-18	277	240	244	199
52	156	493	794	82	94	292	515	1540	158	93	183	566	-22	271	240	244	200

ONE POCKET MIXES ROAD NOTE 4

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
33	61	193	381	52	37	114	251	1516	207	192	147	454	22	354	240	244	201
38	81	257	470	59	49	152	309	1522	192	156	159	493	5	329	240	244	202
42	102	321	559	67	62	190	367	1525	182	131	168	519	- 5	311	240	244	203
47	121	382	644	74	73	226	422	1527	176	114	174	536	- 12	301	240	244	204
33	56	179	362	52	34	106	240	1508	216	201	142	440	30	370	240	244	205
38	72	229	432	59	44	135	287	1509	207	168	153	472	14	354	240	244	206

498:

ROAD NOTE 4 DA PER A PER 0.01 CHANGE IN CF

UP	DOWN	J	UP	DOWN	J	UP	DOWN	J	UP	DOWN	J	UP	DOWN	J
167	189	1	214	252	2	193	224	3	204	238	4	233	278	5
230	274	6	221	262	7	162	182	8	168	190	9	189	218	10
149	166	11	146	162	12	155	174	13	164	185	14	162	183	15
161	181	16	142	148	17	157	175	18	185	196	19	233	250	20
241	259	21	218	233	22	201	214	23	213	228	24	224	240	25
211	226	26	201	214	27	172	181	28	0	0	29	139	0	30
213	251	42	213	254	43	218	257	44	224	266	45	238	286	46
252	306	47	175	200	48	176	201	49	193	223	50	182	209	51
161	182	52	170	193	53	185	213	54	173	196	55	200	213	56
208	222	57	216	231	58	187	198	59	261	284	60	210	224	61
220	236	62	254	275	63	240	258	64	0	0	65	0	0	66
224	256	76	202	235	77	240	289	78	262	320	79	270	333	80
277	344	81	145	162	82	217	256	83	198	229	84	174	198	85
190	220	86	204	238	87	0	0	88	0	0	89	252	272	90
199	212	91	247	267	92	213	227	93	0	0	94	0	0	95
238	286	100	238	286	101	276	342	102	324	419	103	339	445	104
323	417	105	167	139	106	232	277	107	223	265	108	197	228	109
0	0	110	0	0	111	0	0	112	0	0	113	252	272	114
199	212	115	0	0	116	0	0	117	0	0	118	0	0	119
175	200	120	193	223	121	173	196	122	135	149	123	151	169	124
114	124	125	134	148	126	143	159	127	164	185	128	143	159	129
127	139	130	145	161	131	290	317	132	172	182	133	185	196	134
118	122	135	135	140	136	236	254	137	161	169	138	196	208	139
164	185	149	159	179	150	171	195	151	160	180	152	161	182	153
159	179	154	218	258	155	162	183	156	166	186	157	145	162	158
139	145	159	55	56	160	214	228	161	73	75	162	126	131	163
112	116	164	101	104	165	0	0	166	0	0	167	0	0	168
173	197	173	179	204	174	206	241	175	185	213	176	148	165	177
167	189	178	165	187	179	175	200	180	196	228	181	128	133	182
196	208	183	238	256	184	267	290	185	0	0	186	0	0	187
198	230	192	248	300	193	248	300	194	204	238	195	134	212	196
159	179	197	143	159	198	155	174	199	0	0	200	247	267	201
370	417	202	0	0	203	0	0	204	0	0	205	0	0	206

IDENTIFICATION OF MCINTOSH MIXES

Grading No. of Aggregate **	Workability *	J for 3/8" Max. Stone		J for 3/4" Max. Stone		J for $1\frac{1}{2}$" Max. Stone	
		I ***	Cr. ***	I	Cr.	I	Cr.
(1)	VL	1 - 5	13 - 19	272 - 277	290 - 296	505 - 508	523 - 527
	L	6 - 9	20 - 22	278 - 285	297 - 304	509 - 513	528 - 533
	M	10 -11	23 - 24	286 - 288	305 - 307	514 - 519	534 - 538
	H	12	-	289	308	520 - 522	539 - 541
(2)	VL	25 - 29	57 - 63	309 - 314	332 - 338	542 - 545	561 - 566
	L	30 - 37	64 - 72	315 - 322	339 - 346	546 - 550	567 - 573
	M	38 - 46	73 - 84	323 - 327	347 - 352	551 - 556	574 - 580
	H	47 - 56	85 - 97	328 - 331	353 - 354	557 - 560	581 - 584
(3)	VL	98 - 103	135 - 143	355 - 360	387 - 394	585 - 589	607 - 613
	L	104 - 112	144 - 154	361 - 368	395 - 404	590 - 594	614 - 620
	M	113 - 122	155 - 167	369 - 378	405 - 415	595 - 600	621 - 628
	H	123 - 134	168 - 182	379 - 386	416 - 424	601 - 606	629 - 635
(4)	VL	183 - 188	220 - 230	425 - 431	464 - 471	636 - 640	663 - 670
	L	189 - 197	231 - 242	432 - 440	472 - 481	641 - 647	671 - 678
	M	198 - 207	243 - 256	441 - 451	482 - 492	648 - 654	679 - 686
	H	208 - 219	257 - 271	452 - 463	493 - 504	655 - 662	687 - 694

* VL = very low; L = low; M = medium; H = high; the compacting factors differ for these categories as the maximum size of stone changes from 3/8 inches.

** The grading indicated by these numbers changes as the maximum size of aggregate changes.

*** I = irregular aggregate; Cr. = crushed aggregate.

MC INTOSH W/C AND A/C

W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J
40	41	1	45	51	2	50	61	3	55	70	4	60	79	5	40	33	6
45	41	7	50	48	8	55	55	9	45	35	10	50	42	11	45	32	12
40	37	13	45	45	14	50	52	15	55	59	16	60	66	17	65	73	18
70	79	19	45	38	20	50	44	21	55	49	22	45	33	23	50	38	24
40	38	25	45	48	26	50	58	27	55	67	28	60	76	29	40	31	30
45	39	31	50	46	32	55	53	33	60	60	34	65	66	35	70	72	36
75	78	37	45	34	38	50	41	39	55	47	40	60	53	41	65	59	42
70	64	43	75	69	44	80	74	45	85	79	46	45	31	47	50	38	48
55	44	49	60	49	50	65	54	51	70	59	52	75	64	53	80	68	54
85	72	55	90	76	56	40	33	57	45	41	58	50	49	59	55	56	60
60	63	61	65	70	62	70	76	63	45	36	64	50	42	65	55	48	66
60	53	67	65	58	68	70	63	69	75	68	70	80	72	71	85	76	72
45	31	73	50	37	74	55	42	75	60	47	76	65	51	77	70	56	78
75	60	79	80	64	80	85	67	81	90	71	82	95	75	83	100	78	84
50	32	85	55	37	86	60	42	87	65	46	88	70	50	89	75	54	90
80	58	91	85	61	92	90	64	93	95	67	94	100	70	95	105	73	96
110	76	97	40	33	98	45	43	99	50	52	100	55	61	101	60	70	102
65	78	103	40	28	104	45	35	105	50	42	106	55	49	107	60	56	108
65	62	109	70	68	110	75	74	111	80	80	112	45	32	113	50	38	114
55	44	115	60	50	116	65	56	117	70	61	118	75	66	119	80	71	120
85	75	121	90	80	122	45	30	123	50	36	124	55	42	125	60	47	126
65	52	127	70	57	128	75	61	129	80	65	130	85	69	131	90	73	132
95	77	133	100	80	134	40	28	135	45	35	136	50	42	137	55	49	138
60	55	139	65	61	140	70	67	141	75	73	142	80	78	143	45	30	144
50	36	145	55	42	146	60	47	147	65	52	148	70	57	149	75	62	150
80	66	151	85	71	152	90	75	153	95	79	154	45	27	155	50	32	156
55	37	157	60	42	158	65	46	159	70	51	160	75	55	161	80	59	162
85	63	163	90	67	164	95	71	165	100	75	166	105	78	167	50	29	168
55	34	169	60	38	170	65	42	171	70	46	172	75	50	173	80	54	174
85	58	175	90	61	176	95	64	177	100	67	178	105	70	179	110	73	180
115	76	181	120	79	182	40	28	183	45	36	184	50	44	185	55	52	186
60	60	187	65	68	188	40	23	189	45	30	190	50	37	191	55	43	192
60	49	193	65	55	194	70	61	195	75	67	196	80	73	197	45	28	198
50	34	199	55	40	200	60	45	201	65	50	202	70	55	203	75	60	204
80	64	205	85	68	206	90	72	207	45	27	208	50	32	209	55	37	210
60	42	211	65	46	212	70	50	213	75	54	214	80	58	215	85	62	216
90	66	217	95	69	218	100	72	219	40	20	220	45	26	221	50	32	222
55	38	223	60	43	224	65	48	225	70	53	226	75	58	227	80	63	228
85	68	229	90	73	230	45	22	231	50	27	232	55	32	233	60	37	234
65	42	235	70	46	236	75	50	237	80	55	238	85	60	239	90	64	240
95	68	241	100	72	242	45	21	243	50	26	244	55	30	245	60	34	246
65	38	247	70	42	248	75	46	249	80	50	250	85	54	251	90	58	252
95	61	253	100	65	254	105	69	255	110	72	256	50	24	257	55	28	258
60	32	259	65	36	260	70	40	261	75	44	262	80	47	263	85	51	264
90	54	265	95	57	266	100	61	267	105	64	268	110	67	269	115	70	270

MC INTOSH W/C AND A/C

W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J
35	36	272	40	49	273	45	60	274	50	72	275	55	83	276	60	94	277
35	30	278	40	39	279	45	48	280	50	55	281	55	62	282	60	69	283
65	75	234	70	80	235	40	33	286	45	40	287	50	46	288	40	31	289
40	45	290	45	55	291	50	65	292	55	72	293	60	78	294	65	83	295
70	87	296	40	35	297	45	43	298	50	50	299	55	57	300	60	63	301
65	69	302	70	74	303	75	79	304	45	37	305	50	42	306	55	47	307
45	35	308	35	36	309	40	48	310	45	58	311	50	68	312	55	78	313
60	87	314	35	30	315	40	39	316	45	48	317	50	55	318	55	62	319
60	69	320	65	75	321	70	80	322	40	34	323	45	41	324	50	48	325
55	54	326	60	60	327	40	32	328	45	38	329	50	44	330	55	49	331
40	41	332	45	50	333	50	59	334	55	66	335	60	72	336	65	77	337
70	82	338	40	35	339	45	42	340	50	49	341	55	55	342	60	60	343
65	65	344	70	70	345	75	75	346	45	37	347	50	42	348	55	47	349
60	52	350	65	57	351	70	62	352	45	35	353	50	39	354	35	35	355
40	46	356	45	55	357	50	64	358	55	73	359	60	81	360	35	30	361
40	39	362	45	47	363	50	54	364	55	61	365	60	67	366	65	73	367
70	78	368	40	34	369	45	41	370	50	48	371	55	53	372	60	59	373
65	64	374	70	68	375	75	72	376	80	75	377	85	78	378	40	32	379
45	38	330	50	44	331	55	49	382	60	54	383	65	58	384	70	62	385
75	66	386	40	38	387	45	46	388	50	54	389	55	60	390	60	66	391
65	72	392	70	77	393	75	82	394	40	32	395	45	39	396	50	45	397
55	50	398	60	56	399	65	61	400	70	66	401	75	70	402	80	74	403
65	78	404	45	34	405	50	39	406	55	45	407	60	49	408	65	54	409
70	58	410	75	62	411	80	66	412	85	71	413	90	75	414	95	80	415
45	32	416	50	38	417	55	43	418	60	47	419	65	52	420	70	55	421
75	58	422	80	61	423	85	64	424	35	30	425	40	41	426	45	50	427
50	59	428	55	67	429	60	74	430	65	80	431	35	27	432	40	35	433
45	43	434	50	50	435	55	57	436	60	63	437	65	68	438	70	73	439
75	79	440	40	32	441	45	39	442	50	45	443	55	51	444	60	56	445
65	61	446	70	66	447	75	70	448	80	74	449	85	78	450	90	81	451
40	29	452	45	35	453	50	41	454	55	47	455	60	52	456	65	57	457
70	61	458	75	65	459	80	70	460	85	74	461	90	77	462	95	80	463
40	35	464	45	43	465	50	50	466	55	57	467	60	63	468	65	69	469
70	75	470	75	80	471	40	30	472	45	37	473	50	43	474	55	48	475
60	53	476	65	58	477	70	63	478	75	67	479	80	72	480	85	76	481
45	33	482	50	38	483	55	43	484	60	48	485	65	52	485	70	57	487
75	61	488	80	65	439	85	69	490	90	73	491	95	76	492	45	31	493
50	35	494	55	40	495	60	45	496	65	49	497	70	53	498	75	57	499

MC INTOSH W/C AND A/C

W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J
35	40	505	40	53	506	45	66	507	50	78	508	35	34	509	40	45	510
45	56	511	50	66	512	55	76	513	40	38	514	45	46	515	50	55	516
55	62	517	60	70	518	65	78	519	40	34	520	45	41	521	50	48	522
35	34	523	40	49	524	45	60	525	50	72	526	55	81	527	40	40	528
45	49	529	50	58	530	55	66	531	60	74	532	65	81	533	40	33	534
45	41	535	50	48	536	55	55	537	60	61	538	40	31	539	45	37	540
50	44	541	35	39	542	40	52	543	45	65	544	50	77	545	35	33	546
40	45	547	45	56	548	50	66	549	55	76	550	40	38	551	45	47	552
50	57	553	55	65	554	60	73	555	65	81	556	40	35	557	45	44	558
50	52	559	55	59	560	35	34	561	40	46	562	45	57	563	50	68	564
55	77	565	60	86	566	40	38	567	45	47	568	50	56	569	55	64	570
60	72	571	65	79	572	70	85	573	40	33	574	45	41	575	50	48	576
55	55	577	60	62	578	65	69	579	70	75	580	40	31	581	45	38	582
50	45	583	55	52	534	35	36	585	40	48	586	45	60	587	50	71	588
55	81	589	35	32	590	40	42	591	45	53	592	50	63	593	55	72	594
40	37	595	45	46	596	50	55	597	55	63	598	60	71	599	65	78	600
40	33	601	45	43	602	50	51	603	55	59	604	60	67	605	65	73	606
35	32	607	40	42	608	45	52	609	50	62	610	55	71	611	50	80	612
65	88	613	40	36	614	45	44	615	50	53	616	55	61	617	60	69	618
65	76	619	70	83	620	40	32	621	45	39	622	50	47	623	55	54	624
60	61	625	65	68	626	70	75	627	75	81	628	40	29	629	45	37	630
50	45	631	55	52	632	60	59	633	65	55	634	70	71	635	35	32	636
40	43	637	45	53	638	50	63	639	55	73	640	35	29	641	40	38	642
45	48	643	50	57	644	55	65	645	60	74	646	65	81	647	40	34	648
45	43	649	50	51	650	55	59	651	60	66	652	65	73	653	70	79	654
40	31	655	45	40	656	50	48	657	55	55	658	60	63	659	65	69	660
70	74	661	75	80	632	35	29	663	40	38	664	45	47	665	50	56	666
55	64	667	60	72	658	65	79	669	70	86	670	40	33	671	45	42	672
50	50	673	55	58	674	60	66	675	65	73	676	70	79	677	75	35	678
40	30	679	45	38	630	50	46	681	55	53	682	60	60	683	65	66	684
70	73	685	75	78	636	40	27	687	45	34	688	50	42	689	55	48	690

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
38	116	270	517	59	70	160	337	1533	176	143	208	473	14	301	300	305	1
42	144	336	616	67	87	199	401	1537	167	120	218	496	4	285	300	305	2
47	172	401	714	74	104	237	464	1539	160	104	225	512	- 3	273	300	305	3
52	197	461	804	82	120	273	522	1540	156	92	229	522	- 7	267	300	305	4
56	223	520	893	89	135	308	580	1540	153	83	233	531	- 10	263	300	305	5
38	93	217	442	59	56	128	292	1511	203	165	193	439	30	347	300	305	6
42	116	270	522	67	70	160	345	1514	194	140	203	463	18	331	300	305	7
47	135	316	592	74	82	187	391	1514	189	123	210	478	12	324	300	305	8
52	155	362	663	82	94	214	438	1513	186	110	215	489	7	319	300	305	9
42	99	230	465	67	60	136	311	1496	214	155	192	438	31	367	300	305	10
47	118	276	536	74	72	164	358	1498	207	135	201	457	21	355	300	305	11
42	90	211	437	67	55	125	294	1486	227	164	186	423	39	388	300	305	12
38	104	243	479	59	63	144	315	1523	188	153	201	458	21	322	300	305	13
42	127	296	559	67	77	175	367	1524	182	131	210	477	12	311	300	305	14
47	147	342	630	74	89	202	414	1523	179	117	215	489	6	307	300	305	15
52	166	388	700	82	101	230	460	1521	177	105	219	499	2	303	300	305	16
56	186	434	771	89	113	257	507	1521	175	95	223	507	- 1	300	300	305	17
61	206	480	841	96	125	284	554	1520	174	87	225	513	- 3	298	300	305	18
66	223	520	902	104	135	308	595	1518	175	81	227	517	- 5	299	300	305	19
42	107	250	494	67	65	148	328	1505	203	147	198	451	24	348	300	305	20
47	124	290	555	74	75	171	369	1504	201	131	204	464	18	344	300	305	21
52	138	322	606	82	84	191	404	1500	202	119	207	472	14	345	300	305	22
42	93	217	447	67	56	128	300	1489	223	161	188	429	36	381	300	305	23
47	107	250	498	74	65	148	335	1486	221	144	194	441	29	379	300	305	24
38	161	196	489	59	97	116	321	1522	185	150	303	362	80	316	450	456	25
42	203	248	588	67	123	147	385	1527	173	125	320	382	65	297	450	456	26
47	245	300	686	74	149	177	448	1530	165	107	332	396	56	283	450	456	27
52	283	346	776	82	172	205	506	1531	161	95	339	405	50	276	450	456	28
56	321	393	865	89	195	232	564	1532	158	85	345	412	46	270	450	456	29
38	131	160	423	59	79	95	282	1501	210	171	282	337	101	360	450	456	30
42	165	202	503	67	100	119	334	1505	200	144	299	357	84	342	450	456	31
47	195	238	573	74	118	141	381	1505	195	127	310	369	74	333	450	456	32
52	224	274	644	82	136	162	428	1505	191	113	318	379	67	326	450	456	33
56	254	310	714	89	154	184	475	1506	187	102	324	387	62	321	450	456	34
61	279	341	776	96	169	202	516	1504	187	93	328	392	59	320	450	456	35
66	305	372	837	104	185	220	557	1502	186	87	332	396	56	319	450	456	36
71	330	403	898	111	200	239	598	1501	186	81	334	399	54	318	450	456	37
42	144	176	456	67	87	104	306	1489	218	157	285	340	98	373	450	456	38
47	173	212	526	74	105	125	353	1492	210	137	298	355	85	360	450	456	39
52	199	243	588	82	120	144	394	1491	207	122	306	365	78	354	450	456	40
56	224	274	649	89	136	162	435	1490	204	111	312	373	72	350	450	456	41
61	250	305	710	96	151	180	476	1490	202	101	318	379	67	346	450	456	42
66	271	331	761	104	164	196	512	1488	203	94	321	383	65	347	450	456	43
71	292	357	813	111	177	211	547	1485	203	88	323	386	63	348	450	456	44
75	313	383	865	119	190	226	583	1484	203	83	325	388	61	348	450	456	45
80	334	408	917	126	203	242	618	1482	204	78	328	391	59	349	450	456	46
42	131	160	428	67	79	95	289	1479	231	167	275	328	109	395	450	456	47
47	161	196	498	74	97	116	336	1483	221	143	290	346	93	378	450	456	48
52	186	227	559	82	113	135	377	1483	216	128	299	357	84	370	450	456	49
56	207	253	611	89	126	150	413	1481	216	117	304	363	79	369	450	456	50

8624

8625

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
61	228	279	663	96	138	165	448	1479	215	108	309	369	75	368	450	456	51
66	250	305	714	104	151	180	484	1477	215	100	313	373	71	367	450	456	52
71	271	331	766	111	164	196	519	1475	214	93	316	377	69	367	450	456	53
75	288	352	808	119	174	208	549	1472	216	88	317	379	67	370	450	456	54
80	305	372	851	126	185	220	579	1469	218	83	319	380	66	373	450	456	55
85	321	393	893	133	195	232	609	1466	219	79	320	382	65	375	450	456	56
38	110	171	442	59	85	101	293	1508	202	164	289	344	94	346	450	456	57
42	173	212	522	67	105	125	345	1510	193	140	304	363	79	331	450	456	58
47	207	253	602	74	126	150	398	1512	186	121	316	377	69	319	450	456	59
52	237	290	672	82	144	171	445	1512	183	108	323	385	63	314	450	456	60
56	266	326	743	89	162	193	491	1511	181	98	329	392	58	310	450	456	61
61	296	362	813	96	179	214	538	1511	179	90	333	398	54	307	450	456	62
66	321	393	874	104	195	232	579	1509	179	83	336	401	52	307	450	456	63
42	152	186	475	67	92	110	317	1496	210	152	291	347	92	360	450	456	64
47	178	217	536	74	108	128	358	1495	207	134	300	358	83	354	450	456	65
52	203	248	597	82	123	147	400	1494	204	121	308	367	76	349	450	456	66
56	224	274	649	89	136	162	435	1490	204	111	312	373	72	350	450	456	67
61	245	300	700	96	149	177	471	1488	205	102	316	377	69	350	450	456	68
66	266	326	752	104	162	193	506	1486	205	95	319	381	66	351	450	456	69
71	288	352	804	111	174	208	542	1484	205	89	322	384	64	351	450	456	70
75	305	372	846	119	185	220	572	1480	207	84	323	385	63	355	450	456	71
80	321	393	888	126	195	232	602	1477	209	80	324	386	62	359	450	456	72
42	131	160	428	67	79	95	289	1479	231	167	275	328	109	395	450	456	73
47	157	191	489	74	95	113	330	1480	224	146	287	343	96	384	450	456	74
52	178	217	541	82	108	128	366	1477	223	132	294	351	89	382	450	456	75
56	199	243	592	89	120	144	401	1475	222	120	300	358	83	379	450	456	76
61	216	264	635	96	131	156	431	1471	223	112	303	362	80	382	450	456	77
66	237	290	686	104	144	171	467	1470	222	103	308	367	76	381	450	456	78
71	254	310	729	111	154	184	497	1467	224	97	310	369	74	383	450	456	79
75	271	331	771	119	164	196	527	1464	225	92	312	372	72	386	450	456	80
80	283	346	804	126	172	205	551	1459	229	87	312	372	72	392	450	456	81
85	300	367	846	133	182	217	581	1457	230	83	313	374	71	393	450	456	82
89	317	388	888	141	192	229	611	1454	231	79	315	376	70	395	450	456	83
94	330	403	921	148	200	239	635	1451	233	76	315	376	70	400	450	456	84
47	135	165	442	74	82	98	302	1462	245	159	271	324	113	420	450	456	85
52	157	191	494	82	95	113	338	1461	241	143	281	335	102	413	450	456	86
56	178	217	545	89	108	128	373	1460	238	129	288	344	94	408	450	456	87
61	195	238	588	96	118	141	403	1457	239	120	292	349	90	409	450	456	88
66	212	259	630	104	128	153	433	1454	240	111	296	353	87	410	450	456	89
71	228	279	672	111	138	165	463	1452	240	104	299	357	84	411	450	456	90
75	245	300	714	119	149	177	493	1449	241	98	302	360	81	412	450	456	91
80	258	315	747	126	156	187	517	1445	244	93	302	361	81	417	450	456	92
85	271	331	780	133	164	196	541	1441	246	89	303	362	80	422	450	456	93
89	283	346	813	141	172	205	566	1437	249	85	304	362	80	426	450	456	94
94	296	362	846	148	179	214	590	1434	251	82	304	363	79	430	450	456	95
99	309	377	879	156	187	223	614	1431	253	78	305	364	79	434	450	456	96
103	321	393	912	163	195	232	639	1428	255	75	305	364	78	437	450	456	97
38	186	124	442	59	113	73	294	1504	202	164	384	250	206	346	600	606	98
42	243	162	541	67	147	96	358	1512	187	135	411	268	179	319	600	606	99
47	293	196	630	74	178	116	416	1515	178	116	428	278	165	305	600	606	100

8626

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
52	344	229	719	82	209	136	474	1517	172	102	440	286	154	295	600	606	101
56	395	263	808	89	239	156	532	1519	167	91	450	293	147	286	600	606	102
61	440	293	888	96	267	174	585	1519	165	82	456	297	142	282	600	606	103
38	158	105	395	59	96	62	266	1487	223	182	361	235	233	382	600	606	104
42	197	132	465	67	120	78	312	1489	214	154	383	249	207	366	600	606	105
47	237	158	536	74	144	93	359	1491	206	134	400	260	190	353	600	606	106
52	276	184	606	82	168	109	406	1492	201	119	412	268	178	344	600	606	107
56	316	211	677	89	191	125	453	1494	196	106	422	275	169	336	600	606	108
61	350	233	738	96	212	138	494	1492	195	97	429	279	164	334	600	606	109
66	384	256	799	104	232	151	536	1491	194	90	434	282	159	332	600	606	110
71	417	278	860	111	253	165	577	1491	193	84	438	285	156	330	600	606	111
75	451	301	921	119	273	178	618	1490	192	78	442	288	152	328	600	606	112
42	180	120	437	67	109	71	295	1479	226	163	370	241	221	387	600	606	113
47	214	143	498	74	130	85	337	1479	220	143	386	251	204	377	600	606	114
52	248	165	559	82	150	98	378	1480	216	128	398	259	192	369	600	606	115
56	282	188	620	89	171	111	419	1480	212	115	408	265	183	363	600	606	116
61	316	211	682	96	191	125	461	1480	209	105	416	271	175	358	600	606	117
66	344	229	733	104	209	136	496	1478	209	97	420	274	171	358	600	606	118
71	372	248	785	111	226	147	532	1476	209	91	424	276	168	358	600	606	119
75	400	267	837	119	243	158	567	1474	209	85	428	278	165	358	600	606	120
80	423	282	879	126	256	167	597	1471	211	81	429	279	163	361	600	606	121
85	451	301	931	133	273	178	633	1470	211	76	432	281	161	361	600	606	122
42	169	113	418	67	103	67	284	1472	235	170	361	235	232	402	600	606	123
47	203	135	479	74	123	80	325	1473	228	148	378	246	213	390	600	606	124
52	237	158	541	82	144	93	367	1474	222	131	391	255	198	381	600	606	125
56	265	177	592	89	161	105	402	1472	221	120	399	260	191	378	600	606	126
61	293	196	644	96	178	116	438	1470	220	110	406	264	184	377	600	606	127
66	321	214	696	104	195	127	474	1469	219	102	411	268	179	375	600	606	128
71	344	229	738	111	209	136	504	1465	221	96	414	269	177	378	600	606	129
75	367	244	780	119	222	145	534	1462	222	90	416	271	174	381	600	606	130
80	389	259	823	126	236	154	564	1459	224	86	419	272	173	383	600	606	131
85	412	274	865	133	250	162	594	1457	225	81	420	274	171	385	600	606	132
89	434	290	907	141	263	171	624	1455	226	77	422	275	169	387	600	606	133
94	451	301	940	148	273	178	648	1451	229	74	422	275	169	392	600	606	134
38	158	105	395	59	96	62	266	1487	223	182	361	235	233	382	600	606	135
42	197	132	465	67	120	78	312	1489	214	154	383	249	207	366	600	606	136
47	237	158	536	74	144	93	359	1491	206	134	400	260	190	353	600	606	137
52	276	184	606	82	168	109	406	1492	201	119	412	268	178	344	600	606	138
56	310	207	667	89	188	122	448	1491	199	108	420	273	171	340	600	606	139
61	344	229	729	96	209	136	489	1490	197	99	427	278	165	338	600	606	140
66	378	252	790	104	229	149	530	1490	196	91	432	281	161	335	600	606	141
71	412	274	851	111	250	162	571	1489	195	84	437	284	157	333	600	606	142
75	440	293	902	119	267	174	607	1487	195	79	439	286	155	335	600	606	143
42	169	113	418	67	103	67	284	1472	235	170	361	235	232	402	600	606	144
47	203	135	479	74	123	80	325	1473	228	148	378	246	213	390	600	606	145
52	237	158	541	82	144	93	367	1474	222	131	391	255	198	381	600	606	146
56	255	177	592	89	161	105	402	1472	221	120	399	260	191	378	600	606	147
61	293	196	644	96	178	116	438	1470	220	110	406	264	184	377	600	606	148
66	321	214	696	104	195	127	474	1469	219	102	411	268	179	375	600	606	149
71	350	233	747	111	212	138	509	1467	218	95	416	271	175	374	600	606	150

8621

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
75	372	248	790	119	226	147	539	1464	220	89	418	272	173	377	600	606	151
80	400	267	841	126	243	158	575	1463	219	84	422	275	169	375	600	606	152
85	423	282	884	133	256	167	605	1461	221	80	424	276	168	378	600	606	153
89	446	297	926	141	270	176	635	1458	222	76	425	277	167	380	600	606	154
42	152	102	390	67	92	60	267	1460	250	180	345	225	252	427	600	606	155
47	180	120	442	74	109	71	303	1459	245	159	361	235	232	419	600	606	156
52	209	139	494	82	126	82	339	1458	241	142	374	243	218	412	600	606	157
56	237	158	545	89	144	93	374	1457	238	129	384	250	207	407	600	606	158
61	259	173	588	96	157	102	404	1454	238	119	389	253	201	408	600	606	159
66	288	192	639	104	174	113	440	1453	236	110	396	258	193	404	600	606	160
71	310	207	682	111	188	122	470	1451	237	103	400	260	190	405	600	606	161
75	333	222	724	119	202	131	500	1448	237	96	404	263	186	406	600	606	162
80	355	237	766	126	215	140	530	1446	238	91	407	265	184	407	600	606	163
85	378	252	808	133	229	149	560	1444	238	86	409	266	181	408	600	606	164
89	400	267	851	141	243	158	590	1443	239	82	412	268	179	409	600	606	165
94	423	282	893	148	256	167	620	1441	239	78	414	269	177	410	600	606	166
99	440	293	926	156	267	174	644	1438	242	75	414	269	177	414	600	606	167
47	164	109	414	74	99	65	286	1446	259	169	347	226	250	444	600	606	168
52	192	128	465	82	116	76	322	1447	254	150	361	235	232	434	600	606	169
56	214	143	508	89	130	85	352	1444	253	137	369	240	222	433	600	606	170
61	237	158	550	96	144	93	382	1441	253	126	376	245	215	432	600	606	171
66	259	173	592	104	157	102	412	1439	252	117	382	249	208	432	600	606	172
71	282	188	635	111	171	111	442	1437	252	109	387	252	203	431	600	606	173
75	305	203	677	119	185	120	472	1435	252	102	391	255	198	431	600	606	174
80	327	218	719	126	198	129	502	1434	251	96	395	257	195	430	600	606	175
85	344	229	752	133	209	136	526	1430	254	92	397	258	193	434	600	606	176
89	361	241	785	141	219	142	550	1427	256	88	398	259	192	438	600	606	177
94	378	252	818	148	229	149	575	1423	258	84	399	259	191	442	600	606	178
99	395	263	851	156	239	156	599	1421	260	80	400	260	190	445	600	606	179
103	412	274	884	163	250	162	623	1418	262	77	400	261	190	448	600	606	180
108	429	286	917	170	260	169	648	1415	263	74	401	261	189	451	600	606	181
113	446	297	949	178	270	176	672	1413	265	72	402	262	188	453	600	606	182
38	197	66	395	59	120	39	266	1484	223	181	450	146	495	382	750	754	183
42	254	85	475	67	154	50	319	1489	209	151	483	157	448	358	750	754	184
47	310	103	555	74	188	61	372	1493	200	130	506	165	418	342	750	754	185
52	367	122	635	82	222	72	424	1496	192	114	524	170	397	329	750	754	186
56	423	141	714	89	256	83	477	1498	186	101	538	175	381	319	750	754	187
61	479	160	794	96	291	95	530	1500	182	91	549	179	370	311	750	754	188
38	162	54	348	59	98	32	238	1463	249	203	413	135	557	427	750	754	189
42	212	71	418	67	128	42	285	1469	234	169	450	146	495	401	750	754	190
47	261	87	489	74	158	51	332	1473	223	145	476	155	456	382	750	754	191
52	303	101	550	82	184	60	373	1473	218	129	492	160	435	374	750	754	192
56	345	115	611	89	209	68	415	1474	214	116	505	164	419	367	750	754	193
61	388	129	672	96	235	76	456	1474	211	106	515	168	406	362	750	754	194
66	430	143	733	104	261	85	497	1474	209	97	524	171	396	357	750	754	195
71	472	157	794	111	286	93	539	1474	206	89	531	173	388	353	750	754	196
75	515	172	855	119	312	102	580	1474	204	83	538	175	381	350	750	754	197
42	197	66	400	67	120	39	273	1461	244	176	437	142	515	418	750	754	198
47	240	80	461	74	145	47	315	1463	235	153	461	150	478	403	750	754	199
52	282	94	522	82	171	56	356	1464	229	135	480	156	452	392	750	754	200

ONE POCKET MIXES MC INTOSH

8628

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
56	317	106	573	89	192	63	392	1463	227	123	491	160	437	388	750	754	201
61	353	118	625	96	214	70	428	1461	225	113	499	163	426	386	750	754	202
66	388	129	677	104	235	76	463	1460	224	104	507	165	416	383	750	754	203
71	423	141	729	111	256	83	499	1459	223	97	514	167	409	381	750	754	204
75	451	150	771	119	273	89	529	1456	224	91	517	168	405	384	750	754	205
80	479	160	813	126	291	95	559	1454	225	86	519	169	402	386	750	754	206
85	508	169	855	133	308	100	589	1451	226	82	522	170	399	388	750	754	207
42	190	63	390	67	115	38	268	1457	249	180	431	140	526	426	750	754	208
47	226	75	442	74	137	44	304	1455	244	159	450	147	494	418	750	754	209
52	261	87	494	82	158	51	339	1455	240	142	466	152	471	411	750	754	210
56	296	99	545	89	179	58	375	1454	237	129	479	156	453	406	750	754	211
61	324	108	588	96	197	64	405	1450	238	119	485	158	444	407	750	754	212
66	353	118	630	104	214	70	435	1447	238	111	491	160	437	408	750	754	213
71	381	127	672	111	231	75	465	1445	239	104	496	161	430	409	750	754	214
75	409	136	714	119	248	81	495	1442	239	97	500	163	425	410	750	754	215
80	437	146	757	126	265	86	525	1440	240	92	504	164	420	411	750	754	216
85	465	155	799	133	282	92	555	1439	240	87	508	165	416	411	750	754	217
89	486	162	832	141	295	96	580	1435	243	83	509	165	415	416	750	754	218
94	508	169	865	148	308	100	604	1431	245	80	509	166	414	420	750	754	219
38	141	47	320	59	85	28	221	1448	269	218	387	126	608	460	750	754	220
42	183	61	381	67	111	36	262	1452	254	184	424	138	538	436	750	754	221
47	226	75	442	74	137	44	304	1455	244	159	450	147	494	418	750	754	222
52	268	89	503	82	162	53	345	1458	236	140	471	153	464	405	750	754	223
56	303	101	555	89	184	60	381	1457	234	127	483	157	448	400	750	754	224
61	338	113	606	96	205	67	416	1456	231	116	493	160	435	396	750	754	225
66	374	125	658	104	226	74	452	1455	230	107	501	163	424	393	750	754	226
71	409	136	710	111	248	81	488	1455	228	99	508	165	415	390	750	754	227
75	444	148	761	119	269	88	524	1454	226	92	514	167	408	388	750	754	228
80	479	160	813	126	291	95	559	1454	225	86	519	169	402	386	750	754	229
85	515	172	865	133	312	102	595	1453	224	81	524	171	396	384	750	754	230
42	155	52	343	67	94	31	240	1433	279	201	393	128	597	477	750	754	231
47	190	63	395	74	115	38	275	1434	269	175	419	136	546	461	750	754	232
52	226	75	447	82	137	44	311	1436	262	155	440	143	511	449	750	754	233
56	261	87	498	89	158	51	347	1437	257	139	456	148	486	439	750	754	234
61	296	99	550	96	179	58	382	1438	252	126	469	153	466	431	750	754	235
66	324	108	592	104	197	64	412	1436	252	117	477	155	456	431	750	754	236
71	353	118	635	111	214	70	443	1434	251	109	483	157	447	430	750	754	237
75	388	129	686	119	235	76	478	1435	248	101	491	160	436	425	750	754	238
80	423	141	738	126	256	83	514	1436	245	94	499	162	427	420	750	754	239
85	451	150	780	133	273	89	544	1434	245	89	503	164	422	420	750	754	240
89	479	160	823	141	291	95	574	1433	245	84	506	165	418	420	750	754	241
94	508	169	865	148	308	100	604	1431	245	80	509	166	414	420	750	754	242
42	148	49	334	67	90	29	234	1427	285	206	384	125	615	488	750	754	243
47	183	61	385	74	111	36	270	1430	275	179	412	134	559	471	750	754	244
52	212	71	428	82	128	42	300	1427	272	161	428	139	531	466	750	754	245
56	240	80	470	89	145	47	330	1426	270	146	441	143	510	462	750	754	246
61	268	89	512	96	162	53	360	1424	268	134	451	147	493	459	750	754	247
66	296	99	555	104	179	58	390	1423	266	124	460	150	479	456	750	754	248
71	324	108	597	111	197	64	420	1422	265	115	468	152	468	453	750	754	249
75	353	118	639	119	214	70	450	1421	264	107	475	155	458	451	750	754	250

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
80	381	127	682	126	231	75	480	1420	262	100	481	156	450	449	750	754	251
85	409	136	724	133	248	81	510	1419	262	94	486	158	443	448	750	754	252
89	430	143	757	141	261	85	534	1416	263	90	488	159	441	451	750	754	253
94	458	153	799	148	278	90	565	1415	263	85	492	160	435	450	750	754	254
99	486	162	841	156	295	96	595	1415	262	81	496	161	430	448	750	754	255
103	508	169	874	163	308	100	619	1412	263	78	497	162	429	451	750	754	256
47	169	56	367	74	103	33	258	1420	287	187	397	129	588	491	750	754	257
52	197	66	409	82	120	39	288	1418	283	167	415	135	554	484	750	754	258
56	226	75	451	89	137	44	318	1417	279	151	429	140	528	478	750	754	259
61	254	85	494	96	154	50	348	1416	277	138	441	144	508	473	750	754	260
66	282	94	536	104	171	56	379	1416	274	127	452	147	492	469	750	754	261
71	310	103	578	111	188	61	409	1415	272	118	460	150	479	466	750	754	262
75	331	110	611	119	201	65	433	1411	274	111	464	151	474	469	750	754	263
80	360	120	653	126	218	71	463	1411	272	104	471	153	464	466	750	754	264
85	381	127	686	133	231	75	487	1408	274	99	473	154	460	469	750	754	265
89	402	134	719	141	244	79	512	1405	275	94	476	155	457	471	750	754	266
94	430	143	761	148	261	85	542	1405	274	89	481	157	450	468	750	754	267
99	451	150	794	156	273	89	566	1403	275	85	483	157	447	471	750	754	268
103	472	157	827	163	286	93	591	1400	276	82	485	158	445	473	750	754	269
108	494	165	860	170	299	97	615	1398	277	78	486	158	443	474	750	754	270
113	515	172	893	178	312	102	640	1396	278	75	488	159	441	476	750	754	271

ONE POCKET MIXES MC INTOSH

8648

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
33	102	237	465	52	62	140	302	1542	172	160	204	464	18	294	300	305	272
38	138	322	592	59	84	191	382	1550	155	126	219	499	2	266	300	305	273
42	169	395	700	67	103	234	451	1553	148	107	227	518	-5	253	300	305	274
47	203	474	818	74	123	280	526	1556	141	92	234	533	-11	241	300	305	275
52	234	546	926	82	142	323	595	1557	137	81	239	543	-14	235	300	305	276
56	265	619	1034	89	161	366	664	1558	134	73	242	551	-17	229	300	305	277
33	85	197	409	52	51	117	268	1525	193	180	191	436	32	331	300	305	278
38	110	257	498	59	67	152	326	1528	182	148	204	466	17	311	300	305	279
42	135	316	588	67	82	187	384	1531	174	126	214	487	8	298	300	305	280
47	155	362	658	74	94	214	430	1529	172	112	218	497	3	295	300	305	281
52	175	408	729	82	106	241	477	1527	171	101	222	506	0	293	300	305	282
56	195	454	799	89	118	269	524	1526	170	92	225	513	-3	291	300	305	283
61	212	494	860	96	128	292	565	1523	171	85	227	517	-5	292	300	305	284
66	226	526	912	104	137	311	600	1519	173	80	228	519	-5	296	300	305	285
38	93	217	442	59	56	128	292	1511	203	165	193	439	30	347	300	305	286
42	113	263	512	67	68	156	339	1511	197	142	202	459	20	337	300	305	287
47	130	303	573	74	79	179	380	1509	195	127	207	471	14	334	300	305	288
38	87	204	423	59	53	121	281	1504	211	171	188	429	36	361	300	305	289
38	127	296	555	59	77	175	360	1542	165	134	214	487	7	282	300	305	290
42	155	362	653	67	94	214	423	1544	158	114	222	506	0	270	300	305	291
47	183	428	752	74	111	253	486	1546	152	99	228	520	-6	261	300	305	292
52	203	474	823	82	123	280	533	1543	153	90	231	526	-8	262	300	305	293
56	220	513	884	89	133	304	574	1539	155	84	232	529	-9	265	300	305	294
61	234	546	935	96	142	323	610	1534	158	79	233	530	-10	271	300	305	295
66	245	572	978	104	149	339	639	1529	162	75	233	530	-9	278	300	305	296
38	99	230	461	59	60	136	304	1517	195	159	197	449	25	334	300	305	297
42	121	283	541	67	73	167	356	1519	187	135	207	471	15	321	300	305	298
47	141	329	611	74	85	195	402	1518	184	120	212	484	9	315	300	305	299
52	161	375	682	82	97	222	449	1518	182	107	217	494	4	311	300	305	300
56	178	415	743	89	108	245	490	1515	181	98	220	500	2	311	300	305	301
61	195	454	804	96	118	269	531	1513	181	91	222	506	0	311	300	305	302
66	209	487	855	104	126	288	567	1510	183	85	223	509	-1	314	300	305	303
71	223	520	907	111	135	308	602	1507	185	80	224	511	-2	316	300	305	304
42	104	243	484	67	63	144	322	1502	207	150	196	447	26	354	300	305	305
47	118	276	536	74	72	164	358	1498	207	135	201	457	21	355	300	305	306
52	133	309	588	82	80	183	393	1495	207	123	204	466	17	355	300	305	307
42	99	230	465	67	60	136	311	1496	214	155	192	438	31	367	300	305	308
33	118	220	465	52	72	130	302	1541	172	160	238	431	35	294	350	355	309
38	158	293	583	59	96	174	377	1547	157	128	254	461	19	269	350	355	310
42	191	354	682	67	116	210	440	1548	152	109	263	476	12	259	350	355	311
47	224	415	780	74	136	246	504	1549	147	96	269	488	7	252	350	355	312
52	257	477	879	82	156	282	567	1549	144	85	274	497	3	246	350	355	313
56	286	532	968	89	173	315	625	1549	142	77	278	503	1	244	350	355	314
33	99	183	409	52	60	108	268	1524	193	180	223	404	50	331	350	355	315
38	128	238	498	59	78	141	326	1527	182	148	238	432	34	311	350	355	316
42	158	293	588	67	96	174	384	1529	174	125	249	452	24	297	350	355	317
47	181	336	658	74	110	199	431	1527	172	112	255	462	19	295	350	355	318
52	204	379	729	82	124	224	478	1526	171	101	259	469	15	292	350	355	319
56	227	422	799	89	138	249	524	1524	170	92	262	476	12	291	350	355	320
61	247	458	860	96	150	271	565	1522	170	85	265	480	11	292	350	355	321

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
66	263	489	912	104	160	289	601	1518	173	80	266	481	10	296	350	355	322
38	112	208	451	59	68	123	298	1513	199	162	227	412	46	340	350	355	323
42	135	251	522	67	82	148	345	1513	193	140	237	430	35	331	350	355	324
47	158	293	592	74	96	174	392	1512	189	123	244	443	28	324	350	355	325
52	178	330	653	82	108	195	433	1510	188	111	249	451	24	323	350	355	326
56	197	367	714	89	120	217	474	1508	188	102	253	458	21	321	350	355	327
38	105	196	432	59	64	116	287	1507	207	168	222	403	51	354	350	355	328
42	125	232	494	67	76	137	328	1504	203	147	231	419	42	348	350	355	329
47	145	269	555	74	88	159	369	1502	201	131	238	431	35	344	350	355	330
52	161	299	606	82	98	177	405	1499	202	119	242	438	31	345	350	355	331
38	135	251	517	59	82	148	337	1532	176	143	242	439	30	301	350	355	332
42	165	306	606	67	100	181	395	1533	169	122	252	457	21	289	350	355	333
47	194	360	696	74	118	213	453	1535	164	106	260	471	15	280	350	355	334
52	217	403	766	82	132	239	500	1532	163	96	263	477	12	279	350	355	335
56	237	440	827	89	144	260	541	1529	164	89	265	481	10	281	350	355	336
61	253	470	879	96	154	278	576	1525	167	84	266	483	9	286	350	355	337
66	270	501	931	104	164	296	612	1521	170	79	267	484	9	290	350	355	338
38	115	214	461	59	70	127	304	1516	195	159	230	416	43	334	350	355	339
42	138	257	531	67	84	152	351	1515	190	138	239	433	34	326	350	355	340
47	161	299	602	74	98	177	397	1515	187	121	246	446	27	320	350	355	341
52	181	336	663	82	110	199	438	1512	186	110	250	454	23	319	350	355	342
56	197	367	714	89	120	217	474	1508	188	102	253	458	21	321	350	355	343
61	214	397	766	96	130	235	509	1505	189	95	255	462	19	324	350	355	344
66	230	428	818	104	140	253	545	1502	191	89	256	465	18	326	350	355	345
71	247	458	870	111	150	271	580	1499	192	83	258	467	16	328	350	355	346
42	122	226	484	67	74	134	322	1501	207	149	229	415	44	354	350	355	347
47	138	257	536	74	84	152	358	1497	207	135	234	424	38	355	350	355	348
52	155	287	588	82	94	170	393	1494	207	123	238	432	34	355	350	355	349
56	171	318	639	89	104	188	429	1491	207	112	242	438	31	355	350	355	350
61	188	348	691	96	114	206	464	1488	208	104	245	444	28	355	350	355	351
66	204	379	743	104	124	224	500	1486	208	96	247	449	25	356	350	355	352
42	115	214	465	67	70	127	311	1495	214	155	224	407	49	367	350	355	353
47	128	238	508	74	78	141	341	1488	217	141	228	413	45	372	350	355	354
33	138	191	456	52	84	113	297	1536	175	162	282	380	66	299	420	426	355
38	192	251	564	59	110	148	366	1541	162	132	301	405	50	277	420	426	356
42	217	300	653	67	132	177	424	1541	157	114	310	419	42	269	420	426	357
47	253	349	743	74	153	206	482	1541	154	100	318	428	36	263	420	426	358
52	288	398	832	82	175	235	540	1541	151	89	324	436	32	259	420	426	359
56	320	442	912	89	194	261	592	1540	150	81	327	441	29	257	420	426	360
33	118	164	409	52	72	97	269	1522	193	179	267	360	81	331	420	426	361
38	154	213	498	59	93	126	327	1525	182	148	286	385	63	311	420	426	362
42	186	256	578	67	112	152	379	1525	176	127	297	400	53	301	420	426	363
47	213	294	649	74	129	174	426	1523	174	113	304	409	47	298	420	426	364
52	241	333	719	82	146	197	472	1522	173	102	309	416	43	295	420	426	365
56	265	365	780	89	160	216	514	1519	173	94	312	421	40	296	420	426	366
61	288	398	841	96	175	235	555	1517	174	87	315	425	38	297	420	426	367
66	308	425	893	104	187	252	590	1513	176	82	316	426	37	301	420	426	368
38	134	185	451	59	81	110	299	1511	199	161	273	367	76	340	420	426	369
42	162	224	522	67	98	132	345	1511	193	140	284	383	64	331	420	426	370
47	190	262	592	74	115	155	392	1511	189	123	293	395	56	324	420	426	371

ONE POCKET MIXES MC INTOSH

8650

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
52	209	289	644	82	127	171	428	1506	191	113	297	400	53	327	420	426	372
56	233	322	705	89	141	190	469	1504	190	103	301	406	49	325	420	426	373
61	253	349	757	96	153	206	504	1501	191	96	304	410	47	327	420	426	374
66	268	371	799	104	163	219	534	1496	194	90	305	411	46	333	420	426	375
71	284	393	841	111	172	232	564	1492	197	85	306	412	46	338	420	426	376
75	296	409	874	119	179	242	588	1486	202	82	305	411	46	345	420	426	377
80	308	425	907	126	187	252	612	1481	206	79	305	411	46	352	420	426	378
38	126	174	432	59	77	103	287	1505	206	168	267	359	82	353	420	426	379
42	150	207	494	67	91	123	328	1503	203	147	277	373	71	348	420	426	380
47	174	240	555	74	105	142	370	1501	201	130	285	384	64	343	420	426	381
52	193	267	606	82	117	158	405	1497	201	119	289	390	59	345	420	426	382
56	213	294	658	89	129	174	441	1494	202	109	293	395	56	346	420	426	383
61	229	316	700	96	139	187	470	1489	205	102	295	398	55	351	420	426	384
66	245	338	743	104	148	200	500	1484	207	96	297	400	53	355	420	426	385
71	261	360	785	111	158	213	530	1480	210	91	298	402	52	359	420	426	386
38	150	207	489	59	91	123	321	1523	185	150	283	382	65	316	420	426	387
42	182	251	569	67	110	148	373	1523	179	129	295	397	55	306	420	426	388
47	213	294	649	74	129	174	426	1523	174	113	304	409	47	298	420	426	389
52	237	327	710	82	144	194	467	1520	175	103	308	415	44	299	420	426	390
56	261	360	771	89	158	213	508	1517	175	95	311	419	41	300	420	426	391
61	284	393	832	96	172	232	549	1515	175	88	314	423	39	300	420	426	392
66	304	420	884	104	184	248	585	1511	177	82	315	425	38	304	420	426	393
71	324	447	935	111	196	265	620	1508	179	78	316	427	37	307	420	426	394
38	126	174	432	59	77	103	287	1505	206	168	267	359	82	353	420	426	395
42	154	213	503	67	93	126	334	1506	200	144	279	377	69	342	420	426	396
47	178	245	564	74	108	145	375	1503	198	128	287	387	62	338	420	426	397
52	197	273	616	82	120	161	411	1499	199	117	291	393	58	340	420	426	398
56	221	305	677	89	134	181	452	1498	197	107	297	400	53	337	420	426	399
61	241	333	729	96	146	197	487	1495	198	99	300	404	51	339	420	426	400
66	261	360	780	104	158	213	523	1492	198	92	302	407	49	340	420	426	401
71	276	382	823	111	168	226	553	1488	201	87	303	409	48	344	420	426	402
75	292	403	865	119	177	239	583	1484	204	83	304	410	47	349	420	426	403
80	308	425	907	126	187	252	612	1481	206	79	305	411	46	352	420	426	404
42	134	185	456	67	81	110	306	1490	218	158	266	359	83	373	420	426	405
47	154	213	508	74	93	126	341	1487	217	141	273	368	75	372	420	426	406
52	178	245	569	82	108	145	383	1486	213	126	281	379	67	365	420	426	407
56	193	267	611	89	117	158	412	1481	216	117	284	383	64	369	420	426	408
61	213	294	663	96	129	174	448	1479	215	108	288	389	60	368	420	426	409
66	229	316	705	104	139	187	478	1475	217	101	290	392	59	372	420	426	410
71	245	338	747	111	148	200	508	1472	219	95	292	394	57	375	420	426	411
75	261	360	790	119	158	213	538	1469	221	90	294	396	56	378	420	426	412
80	280	387	841	126	170	229	573	1468	220	84	296	400	53	376	420	426	413
85	296	409	884	133	179	242	603	1465	221	80	298	401	52	379	420	426	414
89	316	436	935	141	191	258	639	1465	221	75	300	404	50	378	420	426	415
42	126	174	437	67	77	103	295	1483	226	164	260	350	89	388	420	426	416
47	150	207	498	74	91	123	336	1483	221	144	271	365	78	378	420	426	417
52	170	234	550	82	103	139	371	1481	220	130	277	374	71	376	420	426	418
56	186	256	592	89	112	152	401	1476	222	120	280	378	68	380	420	426	419
61	205	284	644	96	124	168	437	1474	221	110	285	384	64	378	420	426	420
66	217	300	677	104	132	177	461	1468	225	105	285	385	63	385	420	426	421

8651

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J.
71	229	316	710	111	139	187	485	1462	229	99	286	386	63	392	420	426	422
75	241	333	743	119	146	197	510	1457	233	95	286	386	62	398	420	426	423
80	253	349	776	126	153	206	534	1453	236	90	287	387	62	404	420	426	424
33	135	147	409	52	82	87	269	1521	193	179	305	323	114	330	480	486	425
38	185	200	517	59	112	119	338	1529	175	143	332	351	89	300	480	486	426
42	226	244	606	67	137	145	396	1530	168	122	345	365	78	288	480	486	427
47	266	288	696	74	161	171	454	1531	163	106	355	376	70	279	480	486	428
52	302	327	776	82	183	194	507	1530	161	95	362	382	65	275	480	486	429
56	334	362	846	89	202	214	554	1528	161	87	366	387	62	275	480	486	430
61	361	391	907	96	219	231	595	1525	162	81	368	389	60	277	480	486	431
33	122	132	381	52	74	78	252	1511	206	191	293	310	127	352	480	486	432
38	158	171	461	59	96	101	304	1513	195	158	314	333	105	333	480	486	433
42	194	210	541	67	118	124	357	1515	187	135	330	348	91	320	480	486	434
47	225	244	611	74	137	145	404	1514	184	119	339	358	83	314	480	486	435
52	257	279	682	82	156	165	450	1513	181	107	346	366	77	310	480	486	436
56	284	308	743	89	172	182	492	1510	181	98	350	371	73	310	480	486	437
61	307	332	794	96	186	197	527	1507	183	91	353	373	71	313	480	486	438
66	329	357	846	104	200	211	563	1503	184	86	355	375	70	316	480	486	439
71	356	386	907	111	216	228	604	1502	184	80	358	378	68	315	480	486	440
38	144	156	432	59	88	93	288	1504	206	168	304	322	115	353	480	486	441
42	176	191	503	67	107	113	334	1504	200	144	319	337	100	342	480	486	442
47	203	220	564	74	123	130	376	1502	197	128	328	347	92	338	480	486	443
52	230	249	625	82	139	148	417	1500	196	116	335	354	86	335	480	486	444
56	253	274	677	89	153	162	452	1497	197	107	339	358	83	337	480	486	445
61	275	298	729	96	167	176	488	1493	198	99	342	362	80	338	480	486	446
66	298	323	780	104	180	191	523	1491	198	92	345	365	78	339	480	486	447
71	316	342	823	111	191	202	553	1487	201	87	346	366	77	344	480	486	448
75	334	362	865	119	202	214	583	1483	203	83	347	367	76	348	480	486	449
80	352	381	907	126	213	226	613	1480	206	79	348	368	75	352	480	486	450
85	365	396	940	133	222	234	637	1475	209	76	348	368	76	358	480	486	451
38	131	142	404	59	79	84	271	1493	219	178	293	310	127	375	480	486	452
42	158	171	465	67	96	101	312	1492	214	155	307	325	112	366	480	486	453
47	185	200	526	74	112	119	353	1491	210	137	318	336	102	359	480	486	454
52	212	230	588	82	129	136	394	1490	207	122	326	345	94	354	480	486	455
56	235	254	639	89	142	150	430	1487	207	112	331	350	90	354	480	486	456
61	257	279	691	96	156	165	465	1485	207	104	335	354	86	355	480	486	457
66	275	298	733	104	167	176	495	1481	210	97	337	356	84	359	480	486	458
71	293	318	776	111	178	188	525	1477	212	92	339	358	83	362	480	486	459
75	316	342	827	119	191	202	561	1475	212	86	341	361	81	362	480	486	460
80	334	362	870	126	202	214	591	1472	213	82	343	362	80	365	480	486	461
85	347	376	902	133	211	223	615	1468	217	78	342	362	80	371	480	486	462
89	361	391	935	141	219	231	639	1463	220	75	342	362	80	377	480	486	463
38	158	171	461	59	96	101	304	1513	195	158	314	333	105	333	480	486	464
42	194	210	541	67	118	124	357	1515	187	135	330	348	91	320	480	486	465
47	226	244	611	74	137	145	404	1514	184	119	339	358	83	314	480	486	466
52	257	279	682	82	156	165	450	1513	181	107	346	366	77	310	480	486	467
56	284	308	743	89	172	182	492	1510	181	98	350	371	73	310	480	486	468
61	311	337	804	96	189	200	533	1508	181	90	354	375	70	310	480	486	469
66	338	367	865	104	205	217	574	1507	181	84	357	378	68	310	480	486	470
71	361	391	917	111	219	231	610	1504	182	79	359	380	67	312	480	486	471

ONE POCKET MIXES MC INTOSH

8652

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
38	135	147	414	59	82	87	276	1497	215	174	297	314	123	367	480	486	472
42	167	181	484	67	101	107	323	1498	206	149	313	331	106	353	480	486	473
47	194	210	545	74	118	124	364	1497	203	132	323	341	97	348	480	486	474
52	217	235	597	82	131	139	400	1493	204	121	328	347	92	349	480	486	475
56	239	259	649	89	145	153	435	1490	204	111	333	352	88	350	480	486	476
61	262	284	700	96	159	168	471	1487	205	102	337	356	84	350	480	486	477
66	284	308	752	104	172	182	506	1485	205	95	340	360	82	351	480	486	478
71	302	327	794	111	183	194	536	1481	207	90	342	361	80	355	480	486	479
75	325	352	846	119	197	208	572	1479	207	84	344	364	78	355	480	486	480
80	343	371	888	126	208	220	602	1476	209	80	345	365	77	358	480	486	481
42	149	161	447	67	90	95	301	1485	222	160	300	318	119	380	480	486	482
47	171	186	498	74	104	110	336	1482	220	143	309	327	110	378	480	486	483
52	194	210	550	82	118	124	372	1479	219	130	316	335	103	376	480	486	484
56	217	235	602	89	131	139	407	1477	218	118	322	341	97	374	480	486	485
61	235	254	644	96	142	150	437	1473	220	110	325	344	95	377	480	486	486
66	257	279	696	104	156	165	473	1472	220	102	330	349	91	376	480	486	487
71	275	298	738	111	167	176	503	1468	221	96	332	351	89	379	480	486	488
75	293	318	780	119	178	188	533	1465	223	91	334	353	87	381	480	486	489
80	311	337	823	126	189	200	562	1462	224	86	335	355	86	384	480	486	490
85	329	357	865	133	200	211	592	1460	225	81	337	356	84	386	480	486	491
89	343	371	898	141	208	220	617	1456	228	78	337	356	84	391	480	486	492
42	140	152	428	67	85	90	289	1478	231	167	293	310	127	395	480	486	493
47	158	171	470	74	96	101	319	1472	232	151	300	317	120	397	480	486	494
52	180	196	522	82	109	116	355	1470	230	136	308	326	111	393	480	486	495
56	203	220	573	89	123	130	390	1469	228	123	315	333	104	390	480	486	496
61	221	240	616	96	134	142	420	1465	229	115	319	337	101	393	480	486	497
66	239	259	658	104	145	153	450	1462	230	107	322	340	98	395	480	486	498
71	257	279	700	111	156	165	480	1459	232	100	325	343	95	396	480	486	499
75	271	293	733	119	164	174	504	1454	235	96	325	344	95	403	480	486	500
80	284	308	766	126	172	182	529	1449	238	91	326	345	94	408	480	486	501
85	302	327	808	133	183	194	559	1447	239	86	328	347	92	409	480	486	502

ONE POCKET MIXES MC INTOSH

8662

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
33	90	286	503	52	55	169	324	1553	160	149	169	522	-7	274	240	244	505
38	120	379	630	59	72	224	404	1559	147	119	179	555	-18	251	240	244	506
42	149	472	757	67	90	279	484	1563	138	100	186	576	-25	236	240	244	507
47	176	557	874	74	107	330	559	1565	133	86	191	590	-29	227	240	244	508
33	77	243	447	52	46	144	290	1538	179	166	160	495	4	306	240	244	509
38	102	321	555	59	62	190	359	1544	165	134	171	529	-9	283	240	244	510
42	126	400	663	67	77	237	428	1548	156	113	179	553	-17	267	240	244	511
47	149	472	761	74	90	279	492	1549	151	98	184	568	-22	258	240	244	512
52	171	543	860	82	104	321	555	1550	147	87	187	579	-26	252	240	244	513
38	86	271	489	59	52	161	320	1527	185	151	162	502	1	317	240	244	514
42	104	329	569	67	63	194	372	1528	179	129	169	522	-7	307	240	244	515
47	124	393	658	74	75	232	430	1530	172	112	175	541	-13	295	240	244	516
52	140	443	729	82	85	262	477	1529	171	101	178	550	-16	293	240	244	517
56	158	500	808	89	96	296	529	1529	168	91	181	560	-20	288	240	244	518
61	176	557	888	96	107	330	581	1529	166	83	184	568	-22	284	240	244	519
38	77	243	451	59	46	144	298	1516	199	162	156	483	9	341	240	244	520
42	92	293	522	67	56	173	344	1515	194	140	163	503	1	332	240	244	521
47	108	343	592	74	66	203	391	1515	190	123	168	519	-5	325	240	244	522
33	77	243	447	52	46	144	290	1538	179	166	160	495	4	306	240	244	523
38	111	350	592	59	67	207	382	1552	155	126	176	543	-14	266	240	244	524
42	135	429	700	67	82	254	451	1554	148	107	182	563	-21	253	240	244	525
47	152	514	818	74	98	304	525	1557	141	92	187	580	-26	242	240	244	526
52	183	579	907	82	111	342	583	1556	140	83	190	587	-28	239	240	244	527
38	90	286	508	59	55	169	331	1532	179	145	165	510	-2	306	240	244	528
42	111	350	597	67	67	207	389	1534	171	124	172	532	-10	294	240	244	529
47	131	414	686	74	79	245	447	1536	166	108	178	549	-16	284	240	244	530
52	149	472	766	82	90	279	499	1535	163	97	181	559	-20	280	240	244	531
56	167	529	846	89	101	313	551	1535	161	87	184	568	-22	276	240	244	532
61	183	579	917	96	111	342	598	1533	161	81	185	573	-24	276	240	244	533
38	74	236	442	59	45	139	292	1512	203	165	154	478	12	348	240	244	534
42	92	293	522	67	56	173	344	1515	194	140	163	503	1	332	240	244	535
47	108	343	592	74	66	203	391	1515	190	123	168	519	-5	325	240	244	536
52	124	393	663	82	75	232	437	1515	186	110	172	531	-10	319	240	244	537
56	138	436	724	89	83	258	478	1513	186	101	174	539	-13	318	240	244	538
38	70	221	423	59	42	131	281	1506	211	172	151	466	17	361	240	244	539
42	83	264	484	67	51	156	322	1504	207	150	157	486	8	355	240	244	540
47	99	314	555	74	60	186	368	1505	201	131	163	505	0	344	240	244	541
33	117	249	494	52	71	148	319	1549	163	151	223	463	18	279	320	325	542
38	156	332	620	59	95	197	399	1555	149	121	238	493	5	254	320	325	543
42	196	415	747	67	119	246	479	1559	139	101	247	513	-3	238	320	325	544
47	232	492	865	74	140	291	554	1561	134	87	253	526	-8	229	320	325	545
33	99	211	437	52	60	125	285	1533	182	169	211	438	31	312	320	325	546
38	135	288	555	59	82	170	360	1542	165	134	228	473	14	282	320	325	547
42	168	358	663	67	102	212	429	1545	156	112	238	494	5	266	320	325	548
47	199	422	761	74	120	250	492	1547	151	98	244	507	-1	258	320	325	549
52	229	486	860	82	139	287	556	1548	147	87	249	517	-5	251	320	325	550
38	114	243	489	59	69	144	320	1525	185	150	216	448	26	317	320	325	551
42	141	300	578	67	86	178	378	1528	176	127	226	470	15	302	320	325	552
47	171	364	677	74	104	216	442	1532	168	109	235	488	7	287	320	325	553
52	196	415	757	82	119	246	494	1532	165	98	240	498	3	283	320	325	554

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
56	220	467	837	89	133	276	546	1531	163	88	244	505	0	279	320	325	555
61	244	518	917	96	148	306	599	1531	161	81	247	512	-3	276	320	325	556
38	105	224	461	59	64	132	304	1517	195	159	210	436	32	334	320	325	557
42	132	281	550	67	80	166	362	1521	185	133	222	460	20	316	320	325	558
47	156	332	630	74	95	197	414	1522	179	116	229	475	13	307	320	325	559
52	177	377	700	82	108	223	460	1521	177	105	234	485	9	303	320	325	560
33	102	217	447	52	62	129	291	1536	178	166	213	442	29	306	320	325	561
38	138	294	564	59	84	174	365	1544	162	132	230	476	12	278	320	325	562
42	171	364	672	67	104	216	434	1547	154	111	239	496	4	263	320	325	563
47	205	435	780	74	124	257	503	1550	147	96	246	511	-2	252	320	325	564
52	232	492	870	82	140	291	561	1549	145	86	250	519	-5	249	320	325	565
56	259	550	959	89	157	325	619	1548	144	78	253	525	-8	246	320	325	566
38	114	243	489	59	69	144	320	1525	185	150	216	448	26	317	320	325	567
42	141	300	578	67	86	178	378	1528	176	127	226	470	15	302	320	325	568
47	168	358	667	74	102	212	436	1530	170	110	234	486	8	291	320	325	569
52	193	409	747	82	117	242	488	1530	167	99	239	496	4	286	320	325	570
56	217	460	827	89	131	272	541	1530	164	89	243	504	1	282	320	325	571
61	238	505	898	96	144	299	587	1528	164	82	245	509	-1	281	320	325	572
66	256	543	959	104	155	321	628	1526	165	77	247	512	-3	283	320	325	573
38	99	211	442	59	60	125	292	1511	203	165	206	427	37	347	320	325	574
42	123	262	522	67	75	155	345	1513	194	140	217	450	25	331	320	325	575
47	144	307	592	74	88	182	391	1513	189	123	224	464	18	324	320	325	576
52	165	352	663	82	100	208	438	1513	186	110	229	475	13	319	320	325	577
56	186	396	733	89	113	234	485	1513	184	99	233	484	9	314	320	325	578
61	208	441	804	96	126	261	531	1513	181	91	237	491	6	310	320	325	579
66	226	479	865	104	137	284	572	1511	181	84	239	496	4	310	320	325	580
38	93	198	423	59	57	117	281	1504	211	171	201	417	43	361	320	325	581
42	114	243	494	67	69	144	328	1505	203	147	211	438	31	348	320	325	582
47	135	288	564	74	82	170	375	1506	198	129	219	454	23	339	320	325	583
52	156	332	635	82	95	197	421	1506	194	114	225	467	16	331	320	325	584
33	135	203	465	52	82	120	302	1539	172	159	271	397	55	294	400	406	585
38	180	271	583	59	109	160	377	1546	157	128	290	425	38	269	400	406	586
42	226	338	700	67	137	200	452	1550	148	107	303	443	28	253	400	406	587
47	267	400	808	74	162	237	521	1551	142	93	311	455	22	244	400	406	588
52	305	457	907	82	185	270	585	1552	139	82	316	462	19	239	400	406	589
33	120	180	428	52	73	107	280	1529	185	172	261	382	65	317	400	406	590
38	158	237	526	59	96	140	343	1533	173	140	279	408	48	296	400	406	591
42	199	299	635	67	121	177	413	1538	162	117	293	429	36	277	400	406	592
47	237	355	733	74	144	210	476	1540	156	101	302	442	29	267	400	406	593
52	271	406	823	82	164	240	534	1540	153	90	307	450	25	261	400	406	594
38	139	209	479	59	84	123	315	1520	188	153	267	392	59	322	400	406	595
42	173	259	569	67	105	154	373	1524	179	129	281	411	46	306	400	406	596
47	207	310	658	74	125	184	431	1526	172	112	291	426	38	294	400	406	597
52	237	355	738	82	144	210	484	1526	169	100	297	435	33	289	400	406	598
56	267	400	818	89	162	237	536	1526	166	90	302	442	29	284	400	406	599
61	293	440	888	96	178	260	583	1525	165	83	305	447	26	283	400	406	600
38	124	186	442	59	75	110	293	1509	202	165	257	376	69	347	400	406	601
42	162	243	541	67	98	143	356	1517	187	135	275	403	51	320	400	406	602
47	192	288	620	74	116	170	409	1518	181	118	284	416	43	310	400	406	603
52	222	333	700	82	134	197	461	1519	177	105	292	427	37	303	400	406	604

8664

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
56	252	378	780	89	153	224	513	1520	173	94	297	435	32	297	400	406	605
61	274	412	841	96	166	244	555	1517	174	87	300	439	30	297	400	406	606
33	120	180	428	52	73	107	280	1529	185	172	261	382	65	317	400	406	607
38	158	237	526	59	96	140	343	1533	173	140	279	408	48	296	400	406	608
42	196	293	625	67	119	174	407	1536	164	118	291	426	37	281	400	406	609
47	233	350	724	74	141	207	471	1538	158	102	300	440	30	270	400	406	610
52	267	400	813	82	162	237	528	1539	154	91	306	448	26	264	400	406	611
56	301	451	902	89	182	267	586	1539	152	82	311	455	22	260	400	406	612
61	331	496	982	96	201	294	639	1538	151	75	314	460	20	258	400	406	613
38	135	203	470	59	82	120	310	1518	191	156	265	388	61	328	400	406	614
42	165	248	550	67	100	147	362	1519	184	133	277	406	50	315	400	406	615
47	199	299	639	74	121	177	420	1522	176	115	288	421	40	302	400	406	616
52	229	344	719	82	139	204	472	1523	173	102	294	431	35	296	400	406	617
56	259	389	799	89	157	230	525	1523	170	92	300	439	30	290	400	406	618
61	286	429	870	96	173	254	571	1522	169	84	303	444	28	289	400	406	619
66	312	468	940	104	189	277	618	1521	168	78	306	448	26	287	400	406	620
38	120	180	432	59	73	107	287	1506	206	168	254	372	72	353	400	406	621
42	147	220	503	67	89	130	334	1506	200	144	266	390	60	342	400	406	622
47	177	265	583	74	107	157	386	1509	192	125	277	406	49	329	400	406	623
52	203	305	653	82	123	180	433	1509	188	111	284	416	43	322	400	406	624
56	229	344	724	89	139	204	480	1509	185	100	290	424	38	317	400	406	625
61	256	384	794	96	155	227	526	1509	183	92	294	431	35	313	400	406	626
66	282	423	865	104	171	250	573	1509	181	84	298	437	32	310	400	406	627
71	305	457	926	111	185	270	614	1507	181	78	301	440	30	310	400	406	628
38	109	164	404	59	66	97	270	1495	219	178	244	358	83	375	400	406	629
42	139	209	484	67	84	123	323	1500	207	149	261	383	65	354	400	406	630
47	169	254	564	74	103	150	375	1504	198	129	273	400	53	338	400	406	631
52	196	293	635	82	119	174	422	1504	193	114	281	411	46	331	400	406	632
56	222	333	705	89	134	197	468	1505	190	103	287	420	41	325	400	406	633
61	244	367	766	96	148	217	510	1503	189	95	291	426	38	324	400	406	634
66	267	400	827	104	162	237	551	1502	188	88	294	430	35	323	400	406	635
33	141	159	428	52	86	94	280	1527	185	172	306	337	101	317	470	476	636
38	190	214	536	59	115	127	349	1534	170	138	330	363	79	291	470	476	637
42	234	264	635	67	142	156	413	1536	161	117	344	378	68	276	470	476	638
47	278	314	733	74	169	186	477	1538	155	101	354	390	60	266	470	476	639
52	323	364	832	82	195	215	540	1539	151	89	362	398	54	258	470	476	640
33	128	144	400	52	78	85	263	1518	197	183	295	325	112	337	470	476	641
38	168	189	489	59	102	112	321	1521	185	150	317	349	91	316	470	476	642
42	212	239	588	67	129	141	385	1526	173	125	334	368	76	297	470	476	643
47	252	284	677	74	153	168	443	1528	167	109	345	379	67	286	470	476	644
52	292	329	766	82	177	195	501	1529	163	96	353	388	61	279	470	476	645
56	327	369	846	89	198	218	553	1529	161	87	358	394	57	275	470	476	646
61	358	404	917	96	217	239	600	1527	161	80	361	398	54	275	470	476	647
38	150	169	451	59	91	100	299	1510	198	161	305	335	102	340	470	476	648
42	190	214	541	67	115	127	357	1515	187	135	323	355	85	320	470	476	649
47	225	254	620	74	137	150	409	1516	181	118	334	367	76	310	470	476	650
52	261	294	700	82	158	174	462	1517	177	104	342	377	69	302	470	476	651
56	292	329	771	89	177	195	508	1516	175	95	348	383	65	300	470	476	652
61	323	364	841	96	195	215	555	1515	174	87	352	388	61	297	470	476	653
66	349	394	902	104	212	233	596	1513	174	81	355	390	59	298	470	476	654

ONE POCKET MIXES MC INTOSH

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
38	137	154	423	59	83	91	282	1501	210	171	294	324	113	360	470	476	655
42	177	199	512	67	107	118	340	1507	196	142	315	347	92	336	470	476	656
47	212	239	592	74	129	141	392	1509	189	123	328	361	81	323	470	476	657
52	243	274	663	82	147	162	439	1509	186	110	335	369	74	318	470	476	658
56	278	314	743	89	169	186	492	1511	181	98	343	378	68	310	470	476	659
61	305	344	804	96	185	203	533	1509	181	90	347	382	65	310	470	476	660
66	327	369	855	104	198	218	568	1505	183	85	349	384	64	313	470	476	661
71	353	399	917	111	214	236	609	1504	182	79	352	387	62	312	470	476	662
33	128	144	400	52	78	85	263	1518	197	183	295	325	112	337	470	476	663
38	168	189	489	59	102	112	321	1521	185	150	317	349	91	316	470	476	664
42	208	234	578	67	126	139	379	1524	176	127	332	365	77	301	470	476	665
47	247	279	667	74	150	165	437	1526	169	110	343	377	68	290	470	476	666
52	283	319	747	82	171	189	490	1526	166	98	350	385	63	285	470	476	667
56	318	359	827	89	193	212	542	1526	164	89	356	391	59	281	470	476	668
61	349	394	898	96	212	233	589	1524	164	82	359	395	56	280	470	476	669
66	380	428	968	104	230	254	636	1523	163	76	362	399	54	279	470	476	670
38	146	164	442	59	88	97	293	1507	202	164	301	332	105	346	470	476	671
42	186	209	531	67	112	124	351	1512	190	137	320	353	87	325	470	476	672
47	221	249	611	74	134	147	404	1514	184	119	332	365	77	314	470	476	673
52	256	289	691	82	155	171	456	1515	179	106	341	375	70	306	470	476	674
56	292	329	771	89	177	195	508	1516	175	95	348	383	65	300	470	476	675
61	323	364	841	96	195	215	555	1515	174	87	352	388	61	297	470	476	676
66	349	394	902	104	212	233	596	1513	174	81	355	390	59	298	470	476	677
71	376	423	964	111	228	251	638	1511	174	76	357	393	58	299	470	476	678
38	133	149	414	59	80	88	276	1497	215	174	291	320	117	367	470	476	679
42	168	189	494	67	102	112	329	1501	203	147	310	341	97	347	470	476	680
47	203	229	573	74	123	136	381	1505	194	126	323	356	85	333	470	476	681
52	234	264	644	82	142	156	428	1505	191	113	332	365	77	326	470	476	682
56	265	299	714	89	161	177	475	1505	187	102	338	373	72	321	470	476	683
61	292	329	776	96	177	195	516	1503	187	93	343	377	69	320	470	476	684
66	323	364	846	104	195	215	563	1504	184	86	347	382	65	316	470	476	685
71	345	389	898	111	209	230	598	1501	186	81	349	384	63	318	470	476	686
38	119	135	385	59	72	80	259	1486	229	186	279	307	131	391	470	476	687
42	150	169	456	67	91	100	306	1489	218	157	297	327	110	373	470	476	688
47	186	209	536	74	112	124	359	1494	207	134	314	345	94	354	470	476	689
52	212	239	597	82	129	141	400	1493	204	121	322	354	86	349	470	476	690
56	247	279	677	89	150	165	452	1497	197	107	332	365	77	337	470	476	691
61	274	309	738	96	166	183	493	1496	195	98	337	370	73	334	470	476	692

MC INTOSH DA PER A PER 0.01 CHANGE IN CF

UP	DOWN	J	UP	DOWN	J	UP	DOWN	J	UP	DOWN	J	UP	DOWN	J
244	303	1	245	305	2	266	339	3	268	341	4	0	0	5
0	0	6	209	245	7	179	204	8	0	0	9	171	188	10
194	230	14	192	227	15	212	255	16	0	0	17	0	0	18
0	0	19	188	216	20	195	226	21	0	0	22	0	0	23
230	282	25	234	288	26	259	326	27	261	330	28	263	333	29
0	0	30	183	210	31	155	174	32	162	182	33	167	189	34
152	169	35	159	179	36	165	186	37	176	194	38	146	158	39
128	136	40	151	163	41	169	185	42	156	169	43	145	156	44
162	176	45	177	194	46	0	0	47	0	0	48	0	0	49
152	174	58	179	208	59	179	208	60	198	236	61	214	259	62
214	258	63	198	230	64	170	193	65	179	204	66	162	182	67
172	196	68	153	179	69	168	190	70	159	179	71	169	192	72
0	0	73	270	313	74	238	270	75	213	238	76	196	217	77
214	240	78	200	222	79	188	207	80	179	197	81	197	219	82
213	239	83	205	229	84	0	0	85	174	0	86	208	0	87
189	223	98	233	286	99	240	298	100	246	306	101	250	313	102
256	323	103	0	0	104	122	134	105	136	150	106	146	162	107
153	171	108	138	153	109	147	164	110	154	173	111	161	161	112
125	133	113	105	111	114	91	95	115	120	128	116	143	154	117
131	140	118	152	164	119	169	185	120	160	174	121	175	192	122
179	208	136	179	208	137	179	208	138	182	213	139	184	216	140
187	219	141	188	222	142	192	227	143	0	0	144	0	0	145
143	159	144	159	179	145	170	193	146	152	170	147	165	186	148
150	168	149	161	182	150	152	169	151	161	181	152	152	171	153
145	161	154	0	0	155	188	207	156	162	176	157	190	211	158
174	190	159	196	217	160	182	200	161	169	185	162	159	172	163
179	197	164	197	219	165	213	239	166	205	229	167	0	0	168
223	272	183	208	250	184	199	236	185	216	262	186	229	281	187
239	295	188	0	0	189	95	102	190	116	126	191	100	107	192
117	127	193	130	143	194	141	156	195	149	167	196	176	201	197
71	74	198	118	125	199	150	162	200	133	143	201	160	174	202
182	200	203	200	222	204	188	207	205	176	194	206	167	182	207
192	227	221	195	231	222	197	234	223	174	203	224	156	179	225
165	190	226	172	200	227	159	182	228	147	167	229	154	176	230
65	68	231	53	55	232	89	95	233	116	126	234	136	150	235
124	136	236	114	124	237	130	143	238	143	159	239	134	148	240
147	164	241	139	154	242	0	0	243	154	167	244	133	143	245
118	125	246	105	111	247	95	100	248	87	91	249	120	128	250
111	118	251	138	148	252	131	140	253	123	131	254	145	156	255
139	149	256	0	0	257	0	0	258	68	0	259	55	0	260

MC INTOSH DA PER A PER 0.01 CHANGE IN CF

UP	DOWN	J	UP	DOWN	J	UP	DOWN	J	UP	DOWN	J	UP	DOWN	J
238	286	272	292	366	273	286	357	274	337	442	275	361	484	276
380	518	277	0	0	278	220	260	279	238	286	280	234	280	281
0	0	282	0	0	283	0	0	284	0	0	285	202	215	286
317	408	290	312	399	291	330	429	292	298	376	293	275	340	294
241	290	295	213	251	296	0	0	297	199	232	298	229	272	299
251	304	300	0	0	301	0	0	302	0	0	303	0	0	304
180	190	305	0	0	306	0	0	307	0	0	308	0	0	0
238	286	309	268	330	310	246	298	311	273	338	312	293	369	313
296	373	314	0	0	315	183	210	316	208	244	317	182	208	318
184	212	319	186	214	320	0	0	321	0	0	322	196	208	323
244	263	324	278	303	325	309	340	326	0	0	327	0	0	328
209	245	332	229	272	333	242	292	334	238	286	335	238	286	336
223	264	337	209	245	338	0	0	339	170	193	340	204	238	341
208	243	342	190	220	343	176	201	344	163	184	345	0	0	346
180	190	347	238	256	348	0	0	349	0	0	350	0	0	351
204	238	355	217	256	356	208	243	357	223	265	358	235	281	359
247	299	360	0	0	361	183	210	362	182	209	363	159	179	364
187	215	365	171	194	366	176	201	367	183	210	368	196	208	369
244	263	370	278	303	371	252	272	372	282	309	373	312	345	374
294	323	375	278	303	376	0	0	377	0	0	378	0	0	379
226	268	387	217	256	388	238	286	389	238	286	390	216	255	391
218	258	392	204	238	393	209	245	394	0	0	395	183	210	396
190	220	397	143	159	398	179	204	399	164	185	400	173	197	401
163	184	402	154	173	403	128	141	404	196	208	405	85	88	406
148	155	407	136	142	408	123	128	409	172	182	410	215	230	411
253	273	412	329	365	413	0	0	414	0	0	415	0	0	416
143	159	425	209	245	426	200	233	427	218	257	428	213	251	429
212	249	430	214	252	431	0	0	432	122	134	433	133	147	434
143	159	435	150	158	436	159	179	437	147	164	438	137	152	439
163	184	440	312	345	441	342	381	442	296	325	443	261	284	444
238	256	445	219	234	446	253	273	447	238	256	448	180	190	449
171	180	450	165	173	451	0	0	452	0	0	453	0	0	454
204	238	464	199	232	465	200	233	456	226	268	467	227	270	468
228	271	469	229	272	470	232	277	471	0	0	472	154	173	473
166	188	474	149	156	475	135	149	476	148	165	477	136	150	478
128	141	479	139	154	480	132	145	481	202	215	482	263	286	483
233	250	484	208	222	485	192	204	486	234	252	487	219	234	488
256	278	489	290	317	490	274	299	491	263	286	492	0	0	493

MC INTOSH DA PER A PER 0.01 CHANGE IN CF

UP	DOWN	J	UP	DOWN	J	UP	DOWN	J	UP	DOWN	J	UP	DOWN	J
214	252	505	216	254	506	216	255	507	220	260	508	0	0	509
222	263	510	255	311	511	238	286	512	263	323	513	351	392	514
362	407	515	424	486	516	0	0	517	0	0	518	0	0	519
262	321	524	262	321	525	278	345	526	265	325	527	250	303	528
233	279	529	246	298	530	238	286	531	251	304	532	0	0	533
202	215	534	325	360	535	278	303	536	0	0	537	0	0	538
220	260	542	192	222	543	198	230	544	204	238	545	0	0	546
222	263	547	230	274	548	195	226	549	207	242	550	263	286	551
213	227	552	292	321	553	308	339	554	0	0	555	0	0	556
248	301	562	251	304	563	252	306	564	241	290	565	233	278	566
188	215	567	182	209	568	204	238	569	201	234	570	198	230	571
181	207	572	168	190	573	202	215	574	244	263	575	208	222	576
182	192	577	0	0	578	0	0	579	0	0	580	0	0	581
159	179	585	179	204	586	167	189	587	161	181	588	159	179	589
0	0	590	170	193	591	189	217	592	181	208	593	179	204	594
360	404	595	217	233	596	242	261	597	212	226	598	188	199	599
214	228	600	0	0	601	0	0	602	0	0	603	0	0	604
204	238	608	220	260	609	207	243	610	201	234	611	196	228	612
195	226	613	159	179	614	162	183	615	162	182	616	164	185	617
166	187	618	150	168	619	138	152	620	312	345	621	171	180	622
142	148	623	123	128	624	109	113	625	147	154	626	178	188	627
134	148	636	166	188	637	135	149	638	136	150	639	137	152	640
0	0	641	150	168	642	149	166	643	150	168	644	152	169	645
154	173	646	141	157	647	294	323	648	233	250	649	196	208	650
226	242	651	152	159	652	183	193	653	211	225	654	0	0	655
188	216	664	152	170	665	153	171	666	134	148	667	119	130	668
109	117	669	116	127	670	130	143	671	136	150	672	114	124	673
123	135	674	130	143	675	137	152	676	109	117	677	118	128	678
333	370	679	351	392	680	290	317	681	314	347	682	222	238	683
202	215	684	228	245	685	171	180	686	0	0	687	0	0	688

IDENTIFICATION OF MURDOCK MIXES

Grading No. of Aggregate **	Workability *	J for 3/4" Max. Stone	J for $1\frac{1}{2}$" Max. Stone
(4)	VL L M H	1 - 13 105 - 117 209 - 221 313 - 325	53 - 65 157 - 169 261 - 273 365 - 377
(3)	VL L M H	14 - 26 118 - 130 222 - 234 326 - 338	66 - 78 170 - 182 274 - 286 378 - 390
(2)	VL L M H	27 - 39 131 - 143 235 - 247 339 - 351	79 - 91 183 - 195 287 - 299 391 - 403
(1)	VL L M H	40 - 52 144 - 156 248 - 260 352 - 364	92 - 104 196 - 208 300 - 312 404 - 416

* VL = very low; L = low; M = medium; H = high.

** The grading indicated by these numbers is different as the maximum size of stone changes from 3/4 inch to $1\frac{1}{2}$ inch.

ANALYSIS OF THE MURDOCK EQUATION

				CF 0.78			CF 0.85			CF 0.92			CF 0.95		
W/C	SF	%S	W	S	L	J	S	L	J	S	L	J	S	L	J
0.35	689	48	33	140	152	1	128	139	105	120	130	209	117	127	313
0.40	689	48	38	172	186	2	153	166	106	141	152	210	136	148	314
0.45	689	48	42	203	220	3	178	193	107	162	175	211	156	169	315
0.50	689	48	47	234	254	4	203	220	108	183	198	212	176	190	316
0.55	689	48	52	265	288	5	228	247	109	204	220	213	195	211	317
0.60	689	48	56	297	322	6	253	275	110	224	243	214	215	233	318
0.65	689	48	61	328	355	7	279	302	111	245	266	215	234	254	319
0.70	689	48	66	359	389	8	304	329	112	266	289	216	254	275	320
0.75	689	48	71	391	423	9	329	356	113	287	311	217	273	296	321
0.80	689	48	75	422	457	10	354	383	114	308	334	218	293	317	322
0.85	689	48	80	453	491	11	379	411	115	329	357	219	313	339	323
0.90	689	48	85	485	525	12	404	438	116	350	379	220	332	360	324
0.95	689	48	89	516	559	13	429	465	117	371	402	221	352	381	325
0.35	607	42	33	130	180	14	118	163	118	110	151	222	107	148	326
0.40	607	42	38	161	223	15	143	197	119	130	180	223	126	174	327
0.45	607	42	42	192	266	16	168	232	120	151	209	224	146	201	328
0.50	607	42	47	223	309	17	193	266	121	172	238	225	165	228	329
0.55	607	42	52	254	351	18	218	301	122	193	266	226	185	255	330
0.60	607	42	56	286	394	19	243	335	123	214	295	227	204	282	331
0.65	607	42	61	317	437	20	267	369	124	235	324	228	224	309	332
0.70	607	42	66	348	480	21	292	404	125	255	353	229	243	336	333
0.75	607	42	71	379	523	22	317	438	126	276	381	230	262	362	334
0.80	607	42	75	410	566	23	342	473	127	297	410	231	282	389	335
0.85	607	42	80	441	609	24	367	507	128	318	439	232	301	416	336
0.90	607	42	85	472	652	25	392	542	129	339	468	233	321	443	337
0.95	607	42	89	503	695	26	417	576	130	359	496	234	340	470	338
0.35	565	35	33	112	209	27	101	188	131	94	175	235	92	170	339
0.40	565	35	38	140	260	28	124	230	132	113	209	236	109	202	340
0.45	565	35	42	168	312	29	146	271	133	131	244	237	126	235	341
0.50	565	35	47	196	364	30	168	313	134	150	278	238	144	267	342
0.55	565	35	52	224	415	31	191	354	135	169	313	239	161	299	343
0.60	565	35	56	251	467	32	213	395	136	187	348	240	179	332	344
0.65	565	35	61	279	519	33	235	437	137	206	382	241	196	364	345
0.70	565	35	66	307	570	34	258	478	138	224	417	242	213	396	346
0.75	565	35	71	335	622	35	280	520	139	243	451	243	231	429	347
0.80	565	35	75	363	674	36	302	561	140	262	486	244	248	461	348
0.85	565	35	80	391	725	37	325	603	141	280	521	245	266	493	349
0.90	565	35	85	418	777	38	347	644	142	299	555	246	283	525	350
0.95	565	35	89	446	829	39	369	686	143	318	590	247	300	558	351
0.35	507	30	33	102	237	40	91	213	144	84	196	248	82	191	352
0.40	507	30	38	128	299	41	113	263	145	102	238	249	98	230	353
0.45	507	30	42	155	361	42	134	312	146	120	280	250	115	269	354
0.50	507	30	47	181	423	43	155	362	147	138	321	251	132	307	355
0.55	507	30	52	208	485	44	177	412	148	155	363	252	148	346	356
0.60	507	30	56	235	547	45	198	462	149	173	404	253	165	385	357
0.65	507	30	61	261	609	46	219	511	150	191	446	254	182	424	358
0.70	507	30	66	288	671	47	240	561	151	209	487	255	198	463	359
0.75	507	30	71	314	734	48	262	611	152	227	529	256	215	501	360
0.80	507	30	75	341	796	49	283	661	153	244	570	257	231	540	361
0.85	507	30	80	368	858	50	304	710	154	262	612	258	248	579	362
0.90	507	30	85	394	920	51	326	760	155	280	653	259	265	618	363
0.95	507	30	89	421	982	52	347	810	156	298	695	260	281	656	364

1682

ANALYSIS OF THE MURDOCK EQUATION

				CF 0.78			CF 0.85			CF 0.92			CF 0.95		
W/C	SF	%S	W	S	L	J	S	L	J	S	L	J	S	L	J
0.35	585	47	33	148	167	53	134	151	157	124	140	261	121	137	365
0.40	585	47	38	184	208	54	163	184	158	149	168	262	144	162	366
0.45	585	47	42	220	249	55	192	216	159	173	195	263	166	188	367
0.50	585	47	47	257	289	56	221	249	160	197	222	264	189	213	368
0.55	585	47	52	293	330	57	250	282	161	221	249	265	212	239	369
0.60	585	47	56	329	371	58	279	314	162	245	277	266	234	264	370
0.65	585	47	61	365	411	59	308	347	163	269	304	267	257	289	371
0.70	585	47	66	401	452	60	337	380	164	294	331	268	279	315	372
0.75	585	47	71	437	493	61	366	412	165	318	358	269	302	340	373
0.80	585	47	75	473	533	62	395	445	166	342	386	270	324	366	374
0.85	585	47	80	509	574	63	424	478	167	366	413	271	347	391	375
0.90	585	47	85	545	615	64	452	510	168	390	440	272	370	417	376
0.95	585	47	89	581	656	65	481	543	169	415	467	273	392	442	377
0.35	530	40	33	133	199	66	119	179	170	110	165	274	107	161	378
0.40	530	40	38	166	250	67	146	220	171	133	199	275	128	193	379
0.45	530	40	42	200	301	68	174	260	172	156	233	276	150	224	380
0.50	530	40	47	234	351	69	201	301	173	178	267	277	171	256	381
0.55	530	40	52	268	402	70	228	342	174	201	302	278	192	288	382
0.60	530	40	56	302	453	71	255	383	175	224	336	279	213	320	383
0.65	530	40	61	336	504	72	282	424	176	246	370	280	234	352	384
0.70	530	40	66	370	555	73	310	464	177	269	404	281	256	383	385
0.75	530	40	71	404	606	74	337	505	178	292	438	282	277	415	386
0.80	530	40	75	438	656	75	364	546	179	315	472	283	298	447	387
0.85	530	40	80	472	707	76	391	587	180	337	506	284	319	479	388
0.90	530	40	85	505	758	77	418	627	181	360	540	285	340	511	389
0.95	530	40	89	539	809	78	446	668	182	383	574	286	362	542	390
0.35	468	32	33	113	241	79	101	215	183	93	198	287	90	192	391
0.40	468	32	38	144	306	80	126	267	184	114	241	288	109	233	392
0.45	468	32	42	175	371	81	150	320	185	134	285	289	129	273	393
0.50	468	32	47	205	436	82	175	372	186	155	329	290	148	314	394
0.55	468	32	52	236	502	83	200	424	187	175	372	291	167	355	395
0.60	468	32	56	267	567	84	224	477	188	196	416	292	186	396	396
0.65	468	32	61	298	632	85	249	529	189	216	460	293	206	437	397
0.70	468	32	66	328	697	86	274	581	190	237	504	294	225	478	398
0.75	468	32	71	359	763	87	298	634	191	258	547	295	244	518	399
0.80	468	32	75	390	828	88	323	686	192	278	591	296	263	559	400
0.85	468	32	80	420	893	89	347	738	193	299	635	297	282	600	401
0.90	468	32	85	451	959	90	372	791	194	319	678	298	302	641	402
0.95	468	32	89	482	1024	91	397	843	195	340	722	299	321	682	403
0.35	396	24	33	93	296	92	83	261	196	75	239	300	73	231	404
0.40	396	24	38	121	382	93	104	331	197	94	296	301	90	285	405
0.45	396	24	42	148	468	94	126	400	198	112	354	302	107	339	406
0.50	396	24	47	175	554	95	148	469	199	130	412	303	124	393	407
0.55	396	24	52	202	640	96	170	538	200	148	470	304	141	447	408
0.60	396	24	56	229	726	97	192	607	201	167	527	305	158	501	409
0.65	396	24	61	257	813	98	214	676	202	185	585	306	175	554	410
0.70	396	24	66	284	899	99	235	745	203	203	643	307	192	608	411
0.75	396	24	71	311	985	100	257	815	204	221	700	308	209	662	412
0.80	396	24	75	338	1071	101	279	884	205	239	758	309	226	716	413
0.85	396	24	80	366	1157	102	301	953	206	258	816	310	243	770	414
0.90	396	24	85	393	1244	103	323	1022	207	276	874	311	260	824	415
0.95	396	24	89	420	1330	104	345	1091	208	294	931	312	277	878	416

ONE POCKET MIXES MURDOCK

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
33	140	152	419	52	85	90	275	1524	189	175	309	327	110	323	480	486	1
33	128	139	393	52	78	82	260	1515	200	186	299	316	121	342	480	486	105
33	120	130	376	52	73	77	249	1509	208	193	291	306	130	356	480	486	209
33	117	127	370	52	71	75	246	1507	211	196	288	305	133	361	480	486	313
38	172	186	489	59	104	110	322	1521	184	150	324	342	96	316	480	486	2
38	153	166	450	59	93	98	298	1510	199	162	311	329	108	340	480	486	106
38	141	152	425	59	85	90	283	1501	210	170	301	319	118	359	480	486	210
38	136	148	416	59	83	87	278	1498	214	174	298	315	122	366	480	486	314
42	203	220	559	67	123	130	368	1519	181	131	334	353	87	310	480	486	3
42	178	193	507	67	108	114	337	1505	198	143	320	339	99	339	480	486	107
42	162	175	473	67	98	104	316	1495	211	152	310	327	110	361	480	486	211
42	156	169	461	67	95	100	310	1491	216	156	306	323	114	369	480	486	315
47	234	254	629	74	142	150	414	1518	179	116	343	362	80	306	480	486	4
47	203	220	564	74	123	130	376	1502	197	128	328	347	92	338	480	486	108
47	183	198	521	74	111	117	350	1490	212	138	316	334	103	363	480	486	212
47	176	190	507	74	106	113	341	1485	217	141	312	330	107	372	480	486	316
52	265	288	699	82	161	170	461	1516	177	105	349	369	74	303	480	486	5
52	228	247	621	82	138	146	415	1499	197	116	334	353	87	337	480	486	109
52	204	220	570	82	123	130	384	1485	213	126	322	340	98	364	480	486	213
52	195	211	552	82	118	125	373	1480	218	129	317	335	102	374	480	486	317
56	297	322	769	89	180	190	507	1515	175	95	355	375	70	300	480	486	6
56	253	275	678	89	154	162	453	1497	196	106	339	358	83	336	480	486	110
56	224	243	618	89	136	144	417	1482	213	116	326	345	94	365	480	486	214
56	215	233	598	89	130	138	405	1476	220	119	321	340	98	376	480	486	318
61	328	355	839	96	199	210	554	1515	174	87	359	380	67	298	480	486	7
61	279	302	735	96	169	179	492	1495	196	98	343	363	79	335	480	486	111
61	245	266	666	96	149	157	451	1479	214	107	330	349	90	366	480	486	215
61	234	254	643	96	142	150	437	1473	221	110	325	344	95	378	480	486	319
66	359	389	908	104	218	230	600	1514	173	80	363	384	64	296	480	486	8
66	304	329	792	104	184	195	531	1493	196	91	347	367	76	335	480	486	112
66	266	289	715	104	161	171	484	1476	214	100	333	353	87	367	480	486	216
66	254	275	689	104	154	163	469	1470	221	103	328	347	92	379	480	486	320
71	391	423	978	111	237	250	647	1513	172	75	366	387	61	294	480	486	9
71	329	356	849	111	199	211	569	1492	195	85	350	370	74	334	480	486	113
71	287	311	763	111	174	184	518	1474	215	93	336	356	85	368	480	486	217
71	273	296	734	111	166	175	500	1467	222	96	331	350	89	380	480	486	321
75	422	457	1048	119	256	270	693	1513	171	70	369	390	59	293	480	486	10
75	354	383	906	119	214	227	608	1491	195	79	353	373	72	334	480	486	114
75	308	334	811	119	187	198	551	1472	215	87	339	358	83	368	480	486	218
75	293	317	780	119	178	188	532	1465	223	91	334	353	87	381	480	486	322
80	453	491	1118	126	275	291	739	1512	170	65	372	393	58	292	480	486	11
80	379	411	963	126	230	243	647	1489	195	75	355	376	70	334	480	486	115
80	329	357	860	126	200	211	585	1470	215	82	341	361	81	369	480	486	219
80	313	339	825	126	189	200	564	1463	223	85	336	355	85	382	480	486	323
85	485	525	1188	133	294	311	786	1512	170	61	374	395	56	291	480	486	12
85	404	438	1020	133	245	259	686	1489	195	70	357	378	68	333	480	486	116
85	350	379	908	133	212	224	618	1469	216	78	343	363	79	369	480	486	220
85	332	360	871	133	201	213	596	1461	224	81	338	357	84	383	480	486	324
89	516	559	1258	141	313	331	832	1511	169	58	376	397	55	290	480	486	13
89	429	465	1077	141	260	275	724	1488	194	67	359	380	67	333	480	486	117

ONE POCKET MIXES MURDOCK

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
89	371	402	957	141	225	238	652	1467	216	74	345	365	78	370	480	486	221
89	352	381	916	141	213	225	628	1459	224	77	340	359	82	384	480	486	325
33	130	180	437	52	79	106	285	1531	182	169	277	373	72	311	420	426	14
33	118	163	408	52	71	96	268	1522	194	180	267	360	82	332	420	426	118
33	110	151	388	52	66	90	256	1515	203	188	259	350	90	347	420	426	222
33	107	148	381	52	65	87	252	1512	206	191	257	346	93	352	420	426	326
38	161	223	516	59	98	132	337	1530	176	143	290	391	59	301	420	426	15
38	143	197	472	59	87	117	311	1518	191	155	279	376	70	327	420	426	119
38	130	180	442	59	79	107	293	1508	202	164	270	364	79	346	420	426	223
38	126	174	432	59	77	103	287	1505	206	168	267	359	82	353	420	426	327
42	192	266	594	67	117	157	389	1529	172	124	300	404	50	294	420	426	16
42	168	232	536	67	102	137	354	1515	189	136	288	388	61	323	420	426	120
42	151	209	497	67	92	124	330	1504	202	146	278	374	71	346	420	426	224
42	146	201	483	67	88	119	322	1499	207	149	274	370	74	354	420	426	328
47	223	309	673	74	135	183	440	1528	168	109	308	415	44	288	420	426	17
47	193	266	600	74	117	157	397	1512	187	122	295	397	55	320	420	426	121
47	172	238	551	74	104	141	367	1500	202	131	284	383	64	346	420	426	225
47	165	228	534	74	100	135	357	1495	207	135	280	378	68	355	420	426	329
52	254	351	752	82	154	208	492	1528	166	98	314	423	39	284	420	426	18
52	218	301	664	82	132	178	439	1511	186	110	300	405	50	318	420	426	122
52	193	266	605	82	117	158	404	1497	202	119	289	390	60	345	420	426	226
52	185	255	585	82	112	151	393	1491	208	123	285	384	63	356	420	426	330
56	286	394	830	89	173	233	544	1528	164	89	318	429	36	280	420	426	19
56	243	335	728	89	147	198	482	1509	184	100	305	411	46	316	420	426	123
56	214	295	659	89	130	175	441	1494	202	109	294	396	56	345	420	426	227
56	204	282	636	89	124	167	428	1488	208	113	289	390	60	356	420	426	331
61	317	437	909	96	192	259	595	1527	162	81	322	435	33	277	420	426	20
61	267	369	792	96	162	219	525	1508	183	92	309	416	43	314	420	426	124
61	235	324	714	96	142	192	478	1492	201	101	297	401	53	345	420	426	228
61	224	309	687	96	135	183	463	1486	208	104	293	395	56	357	420	426	332
66	348	480	988	104	211	284	647	1527	160	75	326	439	30	275	420	426	21
66	292	404	856	104	177	239	568	1507	183	85	312	421	41	313	420	426	125
66	255	353	768	104	155	209	515	1490	201	94	300	405	50	345	420	426	229
66	243	336	738	104	147	199	498	1483	208	97	296	399	54	357	420	426	333
71	379	523	1066	111	230	310	698	1527	159	69	329	443	28	273	420	426	22
71	317	438	920	111	192	259	611	1506	182	79	315	424	38	312	420	426	126
71	276	381	822	111	167	226	552	1488	201	87	303	409	48	345	420	426	230
71	262	362	789	111	159	214	533	1481	209	90	298	402	52	357	420	426	334
75	410	566	1145	119	248	335	750	1527	158	64	331	446	27	271	420	426	23
75	342	473	984	119	207	280	654	1505	181	74	317	428	37	310	420	426	127
75	297	410	876	119	180	243	589	1487	201	82	305	412	46	344	420	426	231
75	282	389	840	119	171	230	568	1480	209	85	301	406	50	357	420	426	335
80	441	609	1224	126	267	360	802	1526	157	60	333	449	25	269	420	426	24
80	367	507	1048	126	223	300	697	1504	181	69	319	431	35	310	420	426	128
80	318	439	931	126	193	260	627	1485	201	77	307	414	44	344	420	426	232
80	301	416	891	126	183	246	603	1478	209	80	303	406	48	358	420	426	336
85	472	652	1302	133	286	386	853	1526	156	56	335	452	24	268	420	426	25
85	392	542	1112	133	238	320	740	1504	180	65	321	433	34	309	420	426	129
85	339	468	985	133	205	277	664	1484	201	73	309	417	43	344	420	426	233
85	321	443	942	133	194	262	638	1477	209	76	305	411	46	358	420	426	337

ONE POCKET MIXES MURDOCK

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
89	503	695	1381	141	305	411	905	1526	156	53	337	454	23	266	420	426	26
89	417	576	1176	141	253	341	783	1503	180	62	323	435	32	308	420	426	130
89	359	496	1039	141	218	294	701	1483	201	69	311	419	41	344	420	426	234
89	340	470	993	141	206	278	673	1475	209	72	306	413	45	358	420	426	338
33	112	209	448	52	68	123	292	1536	178	165	233	423	39	305	350	355	27
33	101	188	416	52	61	111	273	1526	190	177	225	408	48	326	350	355	131
33	94	175	395	52	57	103	260	1519	199	185	219	397	55	341	350	355	235
33	92	170	388	52	55	101	256	1516	203	188	217	393	58	347	350	355	339
38	140	260	532	59	85	154	346	1536	171	139	245	445	27	293	350	355	28
38	124	230	485	59	75	136	318	1523	186	151	235	427	37	319	350	355	132
38	113	209	453	59	68	124	299	1514	198	161	228	413	45	339	350	355	236
38	109	202	443	59	66	120	293	1510	202	164	225	408	48	346	350	355	340
42	168	312	616	67	102	185	401	1536	166	120	254	460	20	285	350	355	29
42	146	271	553	67	88	160	364	1521	183	132	243	441	29	314	350	355	133
42	131	244	511	67	80	144	339	1510	197	142	235	426	38	337	350	355	237
42	126	235	497	67	77	139	330	1505	202	146	232	420	41	346	350	355	341
47	196	364	700	74	119	215	456	1536	162	106	260	472	14	278	350	355	30
47	168	313	622	74	102	185	409	1519	181	118	249	452	24	310	350	355	134
47	150	278	569	74	91	165	378	1506	196	128	240	436	32	336	350	355	238
47	144	267	552	74	87	158	367	1502	202	131	237	430	35	345	350	355	342
52	224	415	785	82	136	246	511	1535	160	94	265	481	10	273	350	355	31
52	191	354	690	82	116	209	455	1518	179	106	254	461	19	307	350	355	135
52	169	313	627	82	102	185	417	1504	195	116	245	444	28	335	350	355	239
52	161	299	606	82	98	177	404	1498	202	119	241	438	31	345	350	355	343
56	251	467	869	89	152	276	566	1535	157	85	269	488	7	269	350	355	32
56	213	395	759	89	129	234	500	1517	178	96	258	468	16	304	350	355	136
56	187	348	685	89	113	206	456	1502	195	106	249	451	24	334	350	355	240
56	179	332	660	89	108	196	442	1496	201	109	245	444	28	345	350	355	344
61	279	519	953	96	169	307	621	1535	155	78	273	494	4	266	350	355	33
61	235	437	827	96	143	259	546	1516	177	88	261	474	13	302	350	355	137
61	206	382	743	96	125	226	495	1500	194	97	252	456	22	333	350	355	241
61	196	364	715	96	119	215	479	1494	201	101	248	450	25	345	350	355	345
66	307	570	1037	104	186	337	676	1535	154	71	276	500	2	263	350	355	34
66	258	478	896	104	156	283	591	1515	176	82	264	479	11	301	350	355	138
66	224	417	801	104	136	247	535	1498	194	90	254	461	19	332	350	355	242
66	213	396	769	104	129	234	516	1492	201	93	251	455	22	345	350	355	346
71	335	622	1121	111	203	368	730	1535	152	66	278	504	0	261	350	355	35
71	280	520	964	111	170	308	637	1515	175	76	266	483	9	299	350	355	139
71	243	451	859	111	147	267	574	1497	194	84	257	465	17	332	350	355	243
71	231	429	824	111	140	254	553	1490	201	87	253	459	20	344	350	355	347
75	363	674	1206	119	220	399	785	1535	151	61	280	508	-1	259	350	355	36
75	302	561	1033	119	183	332	682	1514	174	71	269	487	8	298	350	355	140
75	262	486	917	119	159	288	613	1496	193	79	259	469	15	331	350	355	244
75	248	461	878	119	150	273	590	1489	201	82	255	462	19	344	350	355	348
80	391	725	1290	126	237	429	840	1535	150	57	282	511	-2	257	350	355	37
80	325	603	1101	126	197	357	728	1514	173	66	270	490	6	297	350	355	141
80	280	521	975	126	170	308	652	1495	193	74	261	472	14	331	350	355	245
80	266	493	933	126	161	292	627	1488	201	77	257	465	17	344	350	355	349
85	418	777	1374	133	254	460	895	1535	149	54	283	514	-3	255	350	355	38
85	347	644	1170	133	210	381	773	1513	173	62	272	493	5	295	350	355	142

ONE POCKET MIXES MURDOCK

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
85	299	555	1033	133	181	329	691	1494	193	70	262	475	13	330	350	355	246
85	283	525	987	133	171	311	664	1486	201	73	258	468	16	344	350	355	350
89	446	829	1458	141	270	490	950	1535	148	51	285	516	-4	254	350	355	39
89	369	686	1238	141	224	406	818	1513	172	59	273	496	4	295	350	355	143
89	318	590	1091	141	192	349	731	1493	193	66	264	478	12	330	350	355	247
89	300	558	1041	141	182	330	701	1485	201	69	260	471	15	344	350	355	351
33	102	237	466	52	62	140	302	1542	172	159	204	465	17	294	300	305	40
33	91	213	431	52	55	126	281	1532	184	171	197	448	26	316	300	305	144
33	84	196	408	52	51	116	267	1524	194	180	191	435	33	332	300	305	248
33	82	191	400	52	50	113	263	1522	198	183	189	430	35	338	300	305	352
38	128	299	559	59	78	177	362	1543	164	133	215	489	7	280	300	305	41
38	113	263	507	59	68	155	331	1531	179	146	206	469	15	307	300	305	145
38	102	238	472	59	62	141	310	1521	191	155	199	454	23	327	300	305	249
38	98	230	460	59	60	136	303	1517	196	159	197	448	25	335	300	305	353
42	155	361	653	67	94	214	423	1544	158	114	222	506	0	270	300	305	42
42	134	312	583	67	81	185	381	1529	175	127	213	485	8	300	300	305	146
42	120	280	536	67	73	165	353	1518	189	137	206	469	16	324	300	305	250
42	115	269	520	67	70	159	344	1513	194	140	203	463	19	332	300	305	354
47	181	423	746	74	110	251	483	1545	153	100	228	519	-5	263	300	305	43
47	155	362	658	74	94	214	431	1529	172	112	218	498	3	295	300	305	147
47	138	321	600	74	83	190	396	1515	187	122	211	480	10	321	300	305	251
47	132	307	580	74	80	182	384	1511	193	126	208	474	13	330	300	305	355
52	208	485	839	82	126	287	543	1545	150	89	232	529	-9	257	300	305	44
52	177	412	734	82	107	244	480	1528	170	100	223	507	-1	291	300	305	148
52	155	363	664	82	94	215	438	1514	186	110	215	489	6	318	300	305	252
52	148	346	640	82	90	205	424	1508	192	114	212	483	9	329	300	305	356
56	235	547	933	89	142	324	603	1546	147	80	236	537	-12	252	300	305	45
56	198	462	810	89	120	273	530	1527	168	91	226	515	-4	287	300	305	149
56	173	404	728	89	105	239	481	1512	185	100	218	497	3	316	300	305	253
56	165	385	700	89	100	228	465	1506	191	104	215	490	6	328	300	305	357
61	261	609	1026	96	158	361	664	1546	145	73	239	544	-14	249	300	305	46
61	219	511	886	96	133	303	580	1527	166	83	229	522	-6	284	300	305	150
61	191	446	792	96	116	264	524	1511	184	92	221	503	1	315	300	305	254
61	182	424	760	96	110	251	505	1505	191	95	218	496	4	326	300	305	358
66	288	671	1119	104	174	397	724	1546	143	67	241	549	-16	245	300	305	47
66	240	561	961	104	146	332	630	1527	165	77	231	527	-9	282	300	305	151
66	209	487	856	104	127	288	567	1510	183	85	223	509	-1	313	300	305	255
66	198	463	821	104	120	274	546	1503	190	88	220	501	1	326	300	305	359
71	314	734	1212	111	191	434	784	1547	142	61	243	554	-18	243	300	305	48
71	262	611	1037	111	159	361	680	1526	164	71	234	532	-10	280	300	305	152
71	227	529	920	111	137	313	610	1509	182	79	225	513	-3	312	300	305	256
71	215	501	881	111	130	297	586	1502	190	82	222	506	0	325	300	305	360
75	341	796	1306	119	207	471	844	1547	140	57	245	558	-19	241	300	305	49
75	283	661	1113	119	172	391	729	1526	163	66	235	536	-12	278	300	305	153
75	244	570	984	119	148	337	652	1508	182	74	227	517	-5	311	300	305	257
75	231	540	941	119	140	320	627	1501	189	77	224	510	-2	324	300	305	361
80	368	858	1399	126	223	507	904	1547	139	53	246	561	-20	239	300	305	50
80	304	710	1189	126	185	420	779	1526	162	62	237	540	-13	277	300	305	154
80	262	612	1048	126	159	362	695	1508	181	69	229	521	-6	310	300	305	258
80	248	579	1001	126	150	343	667	1500	189	72	225	513	-3	323	300	305	362

ONE POCKET MIXES MURDOCK

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
85	394	920	1492	133	239	544	965	1547	138	50	248	564	- 21	237	300	305	51
85	326	760	1264	133	197	450	829	1526	161	58	238	543	- 14	276	300	305	155
85	280	653	1112	133	170	387	738	1507	181	65	230	524	- 7	310	300	305	259
85	265	618	1061	133	160	365	708	1500	189	68	227	517	- 4	323	300	305	363
89	421	982	1586	141	255	581	1025	1547	137	47	249	567	- 22	235	300	305	52
89	347	810	1340	141	210	479	879	1525	160	55	239	545	- 15	274	300	305	156
89	298	695	1176	141	181	411	781	1506	180	62	231	527	- 8	309	300	305	260
89	281	656	1121	141	171	388	748	1499	188	64	228	519	- 6	322	300	305	364
33	148	167	442	52	90	99	289	1531	180	167	311	342	96	307	470	476	53
33	134	151	412	52	81	89	271	1522	192	178	300	330	107	328	470	476	157
33	124	140	392	52	75	83	259	1515	201	186	292	321	116	344	470	476	261
33	121	137	385	52	74	81	255	1512	204	189	289	318	119	349	470	476	365
38	184	208	524	59	112	123	342	1531	173	141	327	359	82	297	470	476	54
38	163	184	478	59	99	109	315	1519	188	153	314	345	94	322	470	476	158
38	149	168	448	59	90	99	297	1509	200	162	304	334	103	342	470	476	262
38	144	162	438	59	87	96	291	1506	204	166	300	330	107	349	470	476	366
42	220	249	605	67	134	147	396	1530	169	122	338	372	72	289	470	476	55
42	192	216	545	67	116	128	359	1516	186	134	324	356	84	318	470	476	159
42	173	195	504	67	105	115	335	1505	199	144	313	344	94	341	470	476	263
42	166	188	490	67	101	111	327	1501	204	147	309	340	98	349	470	476	367
47	257	289	687	74	156	171	449	1530	165	107	346	381	66	283	470	476	56
47	221	249	611	74	134	147	404	1514	184	119	332	365	77	314	470	476	160
47	197	222	560	74	119	131	373	1501	199	129	320	352	88	340	470	476	264
47	189	213	543	74	115	126	363	1496	204	133	316	347	92	350	470	476	368
52	293	330	768	82	177	195	502	1529	162	96	353	389	60	278	470	476	57
52	250	282	677	82	151	167	448	1512	182	108	338	372	72	312	470	476	161
52	221	249	616	82	134	148	411	1498	198	117	326	359	82	339	470	476	265
52	212	239	596	82	128	141	399	1493	204	121	321	354	86	350	470	476	369
56	329	371	850	89	199	219	556	1529	160	87	359	395	56	274	470	476	58
56	279	314	744	89	169	186	492	1511	181	98	343	378	68	309	470	476	162
56	245	277	672	89	149	164	450	1496	198	107	331	364	78	339	470	476	266
56	234	264	649	89	142	156	435	1490	204	111	326	359	82	350	470	476	370
61	365	411	931	96	221	243	609	1529	158	79	363	400	53	271	470	476	59
61	308	347	810	96	187	205	536	1510	180	90	348	383	65	308	470	476	163
61	269	304	728	96	163	180	488	1494	198	99	335	369	75	338	470	476	267
61	257	289	701	96	156	171	471	1488	204	102	330	363	79	350	470	476	371
66	401	452	1013	104	243	267	662	1529	157	73	367	404	51	268	470	476	60
66	337	380	876	104	204	225	581	1509	179	83	351	387	62	306	470	476	164
66	294	331	785	104	178	196	526	1492	197	92	338	373	72	338	470	476	268
66	279	315	754	104	169	186	508	1485	204	95	333	367	76	350	470	476	372
71	437	493	1094	111	265	292	716	1529	155	67	370	407	48	266	470	476	61
71	366	412	942	111	222	244	625	1508	178	77	355	390	59	305	470	476	165
71	318	358	841	111	193	212	564	1490	197	85	342	376	69	337	470	476	269
71	302	340	807	111	183	201	544	1484	204	89	336	370	73	350	470	476	373
75	473	533	1176	119	287	316	769	1529	154	63	373	410	47	264	470	476	62
75	395	445	1009	119	239	263	669	1507	177	72	357	393	57	303	470	476	166
75	342	386	897	119	207	228	602	1489	197	80	344	379	67	337	470	476	270
75	324	366	859	119	197	216	580	1482	204	83	339	373	71	350	470	476	374
80	509	574	1257	126	309	340	823	1528	153	59	375	413	45	262	470	476	63
80	424	478	1075	126	257	283	713	1507	177	68	360	396	56	302	470	476	167

ONE POCKET MIXES MURDOCK

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
80	366	413	953	126	222	244	640	1488	197	75	347	381	65	337	470	476	271
80	347	391	912	126	210	232	616	1481	205	78	341	376	69	350	470	476	375
85	545	615	1339	133	330	364	876	1528	152	55	377	415	44	261	470	476	64
85	452	510	1141	133	274	302	758	1506	176	64	362	398	54	301	470	476	168
85	390	440	1009	133	237	260	679	1487	197	71	349	384	64	337	470	476	272
85	370	417	965	133	224	247	652	1479	205	74	343	378	68	350	470	476	376
89	581	656	1420	141	352	388	929	1528	152	52	379	417	42	259	470	476	65
89	481	543	1208	141	292	321	802	1506	176	60	364	401	53	301	470	476	169
89	415	467	1065	141	251	277	717	1486	196	67	350	386	62	336	470	476	273
89	392	442	1018	141	238	262	688	1478	205	70	345	380	66	350	470	476	377
33	133	199	458	52	80	118	298	1538	174	162	270	395	56	298	400	406	66
33	119	179	425	52	72	106	278	1528	187	173	260	380	66	319	400	406	170
33	110	165	402	52	67	98	265	1520	196	182	252	370	74	336	400	406	274
33	107	161	395	52	65	95	260	1518	199	185	250	366	77	341	400	406	378
38	166	250	548	59	101	148	356	1538	166	135	283	415	44	285	400	406	67
38	146	220	498	59	89	130	326	1526	182	148	272	398	54	311	400	406	171
38	133	199	464	59	81	118	306	1516	194	158	263	385	63	332	400	406	275
38	128	193	453	59	78	114	299	1512	198	161	260	381	66	339	400	406	379
42	200	301	637	67	121	178	414	1538	161	116	293	429	36	276	400	406	68
42	174	260	570	67	105	154	374	1524	178	129	281	412	46	305	400	406	172
42	156	233	525	67	94	138	347	1512	192	139	272	398	55	329	400	406	276
42	150	224	510	67	91	133	338	1508	197	142	268	392	58	338	400	406	380
47	234	351	727	74	142	208	472	1539	157	102	301	440	30	269	400	406	69
47	201	301	643	74	122	178	422	1523	176	114	288	422	40	301	400	406	173
47	178	267	587	74	108	158	389	1510	191	124	278	407	49	326	400	406	277
47	171	256	568	74	104	152	377	1505	196	128	274	402	52	336	400	406	381
52	268	402	816	82	163	238	530	1539	154	91	307	449	25	263	400	406	70
52	228	342	716	82	138	202	470	1522	173	103	294	430	35	297	400	406	174
52	201	302	648	82	122	178	430	1508	190	112	283	415	44	325	400	406	278
52	192	288	626	82	116	170	417	1502	196	116	279	409	47	335	400	406	382
56	302	453	906	89	183	268	588	1539	151	82	311	456	22	259	400	406	71
56	255	383	788	89	155	226	518	1521	172	93	298	437	31	294	400	406	175
56	224	336	710	89	136	199	471	1506	189	102	288	421	40	323	400	406	279
56	213	320	683	89	129	189	456	1500	195	106	284	415	44	334	400	406	383
61	336	504	995	96	204	298	646	1539	149	75	315	461	19	255	400	406	72
61	282	424	861	96	171	251	566	1520	170	85	302	443	29	291	400	406	176
61	246	370	771	96	149	219	513	1504	188	94	291	427	37	322	400	406	280
61	234	352	741	96	142	208	495	1498	195	97	287	421	41	333	400	406	384
66	370	555	1084	104	224	328	704	1540	147	68	318	466	17	252	400	406	73
66	310	464	934	104	188	275	614	1520	169	78	305	447	26	289	400	406	177
66	269	404	833	104	163	239	554	1503	187	87	294	431	35	321	400	406	281
66	256	383	799	104	155	227	534	1497	194	90	290	425	38	333	400	406	385
71	404	606	1174	111	245	358	762	1540	146	63	321	470	15	250	400	406	74
71	337	505	1006	111	204	299	662	1519	168	73	308	451	24	287	400	406	178
71	292	438	894	111	177	259	595	1502	187	81	297	435	32	320	400	406	282
71	277	415	857	111	168	246	573	1495	194	84	293	429	36	332	400	406	386
75	438	656	1263	119	265	388	821	1540	145	59	323	473	13	247	400	406	75
75	364	546	1079	119	221	323	710	1519	167	68	311	455	22	286	400	406	179
75	315	472	956	119	191	279	637	1501	186	76	299	439	31	319	400	406	283
75	298	447	914	119	181	265	612	1494	194	79	295	432	34	332	400	406	387

ONE POCKET MIXES MURDOCK

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
80	472	707	1353	126	286	419	879	1540	143	55	325	476	12	245	400	406	76
80	391	587	1152	126	237	347	758	1519	166	64	313	458	21	284	400	406	180
80	337	506	1017	126	204	299	678	1500	186	71	302	442	29	318	400	406	284
80	319	479	972	126	193	283	651	1493	194	74	297	435	32	331	400	406	388
85	505	758	1442	133	306	449	937	1540	142	51	327	479	11	244	400	406	77
85	418	627	1224	133	254	371	806	1518	165	60	314	460	20	283	400	406	181
85	360	540	1078	133	218	319	719	1499	185	67	303	444	28	318	400	406	285
85	340	511	1030	133	206	302	690	1492	193	70	299	438	31	331	400	406	389
89	539	809	1532	141	327	479	995	1540	142	48	329	481	10	242	400	406	78
89	446	668	1297	141	270	395	854	1518	165	56	316	463	18	282	400	406	182
89	383	574	1140	141	232	340	761	1499	185	63	305	447	26	317	400	406	286
89	362	542	1087	141	219	321	729	1491	193	66	301	440	30	331	400	406	390
33	113	241	481	52	69	142	311	1545	167	155	221	458	21	285	320	325	79
33	101	215	443	52	61	127	289	1535	180	167	212	441	30	308	320	325	183
33	93	198	417	52	56	117	273	1527	190	176	206	428	37	325	320	325	287
33	90	192	409	52	55	113	268	1524	193	180	204	423	39	331	320	325	391
38	144	306	582	59	87	181	376	1547	158	128	232	482	10	270	320	325	80
38	126	267	525	59	76	158	342	1535	173	141	223	463	19	297	320	325	184
38	114	241	486	59	69	143	319	1524	186	151	216	447	26	318	320	325	288
38	109	233	474	59	66	138	311	1521	190	155	213	442	29	326	320	325	392
42	175	371	682	67	106	220	440	1549	151	109	240	499	3	259	320	325	81
42	150	320	606	67	91	189	395	1534	169	122	231	479	11	289	320	325	185
42	134	285	555	67	81	169	365	1522	183	132	223	462	19	313	320	325	289
42	129	273	538	67	78	162	355	1518	188	136	220	456	22	322	320	325	393
47	205	436	783	74	124	258	505	1550	147	95	246	511	-2	251	320	325	82
47	175	372	688	74	106	220	448	1534	165	107	237	491	6	283	320	325	186
47	155	329	624	74	94	195	411	1521	181	117	228	474	13	309	320	325	290
47	148	314	603	74	90	186	398	1516	186	121	225	467	16	319	320	325	394
52	236	502	884	82	143	297	570	1551	143	85	251	521	-6	245	320	325	83
52	200	424	770	82	121	251	502	1534	162	96	241	500	2	278	320	325	187
52	175	372	693	82	106	220	456	1520	179	106	233	483	9	306	320	325	291
52	167	355	668	82	101	210	441	1514	185	109	230	476	12	316	320	325	395
56	267	567	984	89	162	335	634	1552	140	76	255	529	-9	240	320	325	84
56	224	477	851	89	136	282	555	1534	160	87	245	506	-1	274	320	325	188
56	196	416	762	89	119	246	502	1518	177	96	236	490	6	303	320	325	292
56	186	396	733	89	113	234	484	1513	184	100	233	484	9	314	320	325	396
61	298	632	1085	96	180	374	699	1552	138	69	258	535	-11	236	320	325	85
61	249	529	933	96	151	313	608	1533	158	79	248	514	-4	271	320	325	189
61	216	460	831	96	131	272	548	1518	176	88	239	497	3	301	320	325	293
61	206	437	797	96	125	258	528	1511	183	91	236	490	6	313	320	325	397
66	328	697	1186	104	199	413	764	1553	136	63	261	540	-13	233	320	325	86
66	274	581	1015	104	166	344	662	1533	157	73	251	520	-6	268	320	325	190
66	237	504	900	104	144	298	594	1517	175	81	242	502	1	299	320	325	294
66	225	478	862	104	136	283	571	1510	182	84	239	495	4	311	320	325	398
71	359	763	1286	111	218	451	828	1553	134	58	263	545	-15	230	320	325	87
71	298	634	1096	111	181	375	715	1533	155	67	253	524	-7	266	320	325	191
71	258	547	969	111	156	324	639	1516	174	75	244	507	-1	298	320	325	295
71	244	518	927	111	148	307	614	1510	181	79	241	500	2	310	320	325	399
75	390	828	1387	119	236	490	893	1553	133	54	264	549	-16	227	320	325	88
75	323	686	1178	119	196	406	768	1533	154	63	255	528	-9	264	320	325	192

ONE POCKET MIXES MURDOCK

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%		T	U	SW%	SV%	J
75	278	591	1038	119	169	350	685	1516	173	70	246	510	-	2	296	320	325	296
75	263	559	992	119	159	331	657	1509	180	73	243	503		1	309	320	325	400
80	420	893	1488	126	255	529	958	1554	132	50	266	552	-	17	225	320	325	89
80	347	738	1260	126	211	437	822	1533	153	59	256	532	-	10	263	320	325	193
80	299	635	1107	126	181	376	731	1515	172	66	248	514	-	3	295	320	325	297
80	282	600	1056	126	171	355	700	1508	180	69	244	507	-	1	308	320	325	401
85	451	959	1588	133	273	567	1022	1554	131	47	267	555	-	18	223	320	325	90
85	372	791	1341	133	226	468	875	1533	152	55	258	535	-	11	261	320	325	194
85	319	678	1176	133	193	401	777	1515	172	62	249	517	-	5	294	320	325	298
85	302	641	1121	133	183	379	744	1508	179	65	246	510	-	2	307	320	325	402
89	482	1024	1689	141	292	606	1087	1554	130	44	269	557	-	19	222	320	325	91
89	397	843	1423	141	240	499	928	1533	152	52	259	537	-	12	260	320	325	195
89	340	722	1245	141	206	427	822	1514	171	59	250	520	-	6	293	320	325	299
89	321	682	1186	141	194	403	787	1507	179	61	247	513	-	3	306	320	325	403
33	93	296	516	52	57	175	332	1556	157	145	171	527	-	9	268	240	244	92
33	83	261	471	52	50	155	305	1545	170	158	164	507	-	1	291	240	244	196
33	75	239	441	52	46	141	287	1536	181	168	159	492		5	310	240	244	300
33	73	231	431	52	44	137	281	1533	185	172	157	486		8	316	240	244	404
38	121	382	634	59	73	226	406	1560	146	119	180	556	-	18	250	240	244	93
38	104	331	567	59	63	196	366	1546	162	132	173	534	-	11	277	240	244	197
38	94	296	522	59	57	175	340	1536	175	142	167	516	-	4	299	240	244	301
38	90	285	506	59	55	169	331	1532	179	146	165	510	-	2	307	240	244	405
42	148	468	752	67	90	277	481	1562	139	100	186	575	-	25	237	240	244	94
42	126	400	662	67	77	237	428	1548	156	113	179	553	-	17	267	240	244	198
42	112	354	602	67	68	209	392	1535	170	123	173	534	-	11	291	240	244	302
42	107	339	582	67	65	200	380	1531	175	127	171	527	-	9	300	240	244	406
47	175	554	870	74	106	328	556	1564	133	87	191	589	-	29	228	240	244	95
47	148	469	758	74	90	277	490	1548	151	98	183	567	-	22	259	240	244	199
47	130	412	683	74	79	244	445	1535	167	108	177	548	-	16	285	240	244	303
47	124	393	658	74	75	232	430	1530	172	112	175	541	-	13	295	240	244	407
52	202	640	988	82	123	379	631	1566	129	76	194	600	-	32	221	240	244	96
52	170	538	854	82	103	318	551	1549	148	87	187	578	-	25	253	240	244	200
52	148	470	764	82	90	278	497	1535	164	97	181	559	-	19	281	240	244	304
52	141	447	733	82	85	264	479	1529	170	101	178	551	-	17	291	240	244	408
56	229	726	1106	89	139	430	706	1567	126	68	197	609	-	34	216	240	244	97
56	192	607	949	89	116	359	613	1550	145	79	190	586	-	28	249	240	244	201
56	167	527	844	89	101	312	550	1535	162	88	183	567	-	22	277	240	244	305
56	158	501	809	89	96	296	529	1529	168	91	181	560	-	20	288	240	244	409
61	257	813	1224	96	156	481	781	1568	123	62	199	616	-	36	211	240	244	98
61	214	676	1045	96	129	400	674	1550	143	71	192	594	-	30	245	240	244	202
61	185	585	925	96	112	346	603	1535	160	80	186	574	-	24	274	240	244	306
61	175	554	885	96	106	328	579	1529	166	83	183	567	-	22	285	240	244	410
66	284	899	1343	104	172	532	856	1569	121	56	201	621	-	38	208	240	244	99
66	235	745	1141	104	143	441	736	1550	141	66	194	600	-	32	241	240	244	203
66	203	643	1006	104	123	380	655	1534	158	74	188	580	-	26	271	240	244	307
66	192	608	960	104	116	360	628	1528	165	77	185	573	-	24	283	240	244	411
71	311	985	1461	111	189	583	931	1569	119	52	203	626	-	39	205	240	244	100
71	257	815	1236	111	156	482	797	1551	139	60	196	605	-	33	239	240	244	204
71	221	700	1086	111	134	414	708	1534	157	68	189	585	-	28	269	240	244	308
71	209	662	1036	111	127	392	678	1528	164	71	187	578	-	25	281	240	244	412

1023

ONE POCKET MIXES   MURDOCK

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
75	338	1071	1579	119	205	634	1006	1570	118	48	204	630	-40	202	240	244	101
75	279	884	1332	119	169	523	859	1551	138	56	197	609	-34	236	240	244	205
75	239	758	1167	119	145	449	761	1534	156	63	191	590	-29	267	240	244	309
75	226	716	1112	119	137	424	728	1526	163	66	188	582	-27	279	240	244	413
80	366	1157	1697	126	222	685	1081	1570	117	45	205	634	-41	200	240	244	102
80	301	953	1428	126	182	564	920	1551	137	52	198	613	-35	234	240	244	206
80	258	816	1248	126	156	483	813	1534	155	59	192	594	-30	265	240	244	310
80	243	770	1187	126	147	456	777	1527	162	62	190	586	-28	278	240	244	414
85	393	1244	1815	133	238	736	1156	1571	115	42	206	637	-42	198	240	244	103
85	323	1022	1523	133	196	605	982	1551	136	49	199	616	-36	233	240	244	207
85	276	874	1328	133	167	517	866	1534	154	56	193	597	-31	264	240	244	311
85	260	824	1263	133	158	488	827	1527	161	58	191	590	-29	276	240	244	415
89	420	1330	1933	141	255	787	1230	1571	114	39	207	640	-42	196	240	244	104
89	345	1091	1619	141	209	646	1044	1552	135	46	200	615	-37	231	240	244	208
89	294	931	1409	141	178	551	918	1534	153	52	194	600	-32	263	240	244	312
89	277	878	1339	141	168	520	877	1527	161	55	192	593	-30	275	240	244	416

MURDOCK W/C AND A/C

J	W/C	A/C
1	35	311
2	40	380
3	45	450
4	50	519
5	55	588
6	60	658
7	65	727
8	70	796
9	75	866
10	80	935
11	85	1004
12	90	1074
13	95	1143
14	35	330
15	40	408
16	45	487
17	50	566
18	55	645
19	60	723
20	65	802
21	70	881
22	75	959
23	80	1038
24	85	1117
25	90	1196
26	95	1274
27	35	341
28	40	426
29	45	511
30	50	595
31	55	680
32	60	764
33	65	849
34	70	933
35	75	1018
36	80	1103
37	85	1187
38	90	1272
39	95	1356
40	35	361
41	40	455
42	45	549
43	50	644
44	55	738
45	60	832
46	65	926
47	70	1020
48	75	1115
49	80	1209
50	85	1303
51	90	1397
52	95	1492

J	W/C	A/C
105	35	284
106	40	339
107	45	395
108	50	450
109	55	506
110	60	562
111	65	617
112	70	673
113	75	729
114	80	784
115	85	840
116	90	896
117	95	951
118	35	299
119	40	362
120	45	425
121	50	488
122	55	551
123	60	614
124	65	678
125	70	741
126	75	804
127	80	867
128	85	930
129	90	993
130	95	1056
131	35	308
132	40	376
133	45	444
134	50	512
135	55	579
136	60	647
137	65	715
138	70	783
139	75	851
140	80	919
141	85	986
142	90	1054
143	95	1122
144	35	324
145	40	399
146	45	475
147	50	550
148	55	626
149	60	702
150	65	777
151	70	853
152	75	928
153	80	1004
154	85	1080
155	90	1155
156	95	1231

J	W/C	A/C
209	35	265
210	40	312
211	45	358
212	50	405
213	55	451
214	60	497
215	65	544
216	70	590
217	75	637
218	80	683
219	85	730
220	90	776
221	95	823
222	35	278
223	40	331
224	45	383
225	50	436
226	55	489
227	60	541
228	65	594
229	70	647
230	75	700
231	80	752
232	85	805
233	90	858
234	95	910
235	35	286
236	40	342
237	45	399
238	50	456
239	55	512
240	60	569
241	65	625
242	70	682
243	75	739
244	80	795
245	85	852
246	90	909
247	95	965
248	35	299
249	40	362
250	45	425
251	50	488
252	55	551
253	60	614
254	65	677
255	70	740
256	75	804
257	80	867
258	85	930
259	90	993
260	95	1056

J	W/C	A/C
313	35	259
314	40	302
315	45	346
316	50	389
317	55	433
318	60	476
319	65	519
320	70	563
321	75	606
322	80	650
323	85	693
324	90	736
325	95	780
326	35	271
327	40	320
328	45	369
329	50	419
330	55	468
331	60	517
332	65	566
333	70	615
334	75	665
335	80	714
336	85	763
337	90	812
338	95	862
339	35	278
340	40	331
341	45	384
342	50	437
343	55	490
344	60	543
345	65	596
346	70	648
347	75	701
348	80	754
349	85	807
350	90	860
351	95	913
352	35	290
353	40	349
354	45	408
355	50	467
356	55	526
357	60	585
358	65	644
359	70	703
360	75	762
361	80	821
362	85	880
363	90	939
364	95	998

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J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
53	35	336	157	35	303	261	35	282	365	35	275
54	40	417	158	40	369	262	40	336	366	40	326
55	45	499	159	45	434	263	45	391	367	45	377
56	50	581	160	50	500	264	50	446	368	50	428
57	55	662	161	55	565	265	55	501	369	55	479
58	60	744	162	60	631	266	60	555	370	60	530
59	65	826	163	65	697	267	65	610	371	65	581
60	70	907	164	70	762	268	70	665	372	70	632
61	75	989	165	75	828	269	75	719	373	75	683
62	80	1071	166	80	893	270	80	774	374	80	734
63	85	1152	167	85	959	271	85	829	375	85	785
64	90	1234	168	90	1024	272	90	884	376	90	837
65	95	1316	169	95	1090	273	95	938	377	95	888
66	35	353	170	35	317	274	35	293	378	35	285
67	40	443	171	40	389	275	40	353	379	40	342
68	45	533	172	45	462	276	45	414	380	45	398
69	50	623	173	50	534	277	50	474	381	50	454
70	55	713	174	55	606	278	55	535	382	55	511
71	60	803	175	60	679	279	60	595	383	60	567
72	65	894	176	65	751	280	65	655	384	65	623
73	70	984	177	70	823	281	70	716	385	70	680
74	75	1074	178	75	896	282	75	776	386	75	736
75	80	1164	179	80	968	283	80	837	387	80	793
76	85	1254	180	85	1040	284	85	897	388	85	849
77	90	1344	181	90	1113	285	90	957	389	90	905
78	95	1434	182	95	1185	286	95	1018	390	95	962
79	35	377	183	35	336	287	35	309	391	35	300
80	40	479	184	40	418	288	40	377	392	40	364
81	45	581	185	45	500	289	45	446	393	45	428
82	50	683	186	50	582	290	50	514	394	50	492
83	55	785	187	55	664	291	55	583	395	55	556
84	60	887	188	60	746	292	60	651	396	60	619
85	65	989	189	65	828	293	65	719	397	65	683
86	70	1091	190	70	909	294	70	788	398	70	747
87	75	1193	191	75	991	295	75	856	399	75	811
88	80	1295	192	80	1073	296	80	925	400	80	875
89	85	1397	193	85	1155	297	85	993	401	85	939
90	90	1500	194	90	1237	298	90	1061	402	90	1003
91	95	1602	195	95	1319	299	95	1130	403	95	1066
92	35	414	196	35	366	300	35	334	404	35	323
93	40	534	197	40	463	301	40	415	405	40	399
94	45	655	198	45	560	302	45	496	406	45	474
95	50	776	199	50	656	303	50	576	407	50	550
96	55	896	200	55	753	304	55	657	408	55	625
97	60	1017	201	60	850	305	60	738	409	60	701
98	65	1138	202	65	947	306	65	819	410	65	776
99	70	1258	203	70	1043	307	70	900	411	70	852
100	75	1379	204	75	1140	308	75	980	412	75	927
101	80	1500	205	80	1237	309	80	1061	413	80	1003
102	85	1620	206	85	1334	310	85	1142	414	85	1078
103	90	1741	207	90	1431	311	90	1223	415	90	1154
104	95	1861	208	95	1527	312	95	1304	416	95	1229

MURDOCK DA PER A PER 0.01 CHANGE IN CF

CF 0.78 ALT	J	CF 0.85 ALT	J	CF 0.92 ALT	J	CF 0.95 ALT	J
157	1	111	105	83	209	74	313
193	2	139	106	105	210	95	314
217	3	159	107	122	211	111	315
235	4	174	108	135	212	123	316
249	5	186	109	146	213	133	317
260	6	196	110	154	214	141	318
269	7	204	111	161	215	147	319
276	8	210	112	167	216	153	320
282	9	216	113	172	217	158	321
287	10	220	114	176	218	162	322
292	11	225	115	180	219	165	323
296	12	228	116	184	220	169	324
299	13	231	117	186	221	172	325
3312		2500		1973		1800	TOTALS
168	14	119	118	90	222	80	326
204	15	148	119	113	223	102	327
228	16	168	120	130	224	117	328
245	17	183	121	143	225	130	329
258	18	194	122	153	226	139	330
268	19	203	123	161	227	147	331
277	20	211	124	167	228	153	332
283	21	217	125	173	229	159	333
289	22	222	126	178	230	163	334
294	23	226	127	182	231	167	335
298	24	230	128	185	232	171	336
301	25	234	129	188	233	174	337
305	26	236	130	191	234	176	338
6729		5092		2054		3678	TOTALS
174	27	124	131	94	235	84	339
210	28	153	132	117	236	106	340
233	29	173	133	134	237	121	341
250	30	187	134	147	238	133	342
263	31	199	135	157	239	143	343
273	32	207	136	164	240	150	344
281	33	214	137	171	241	157	345
287	34	220	138	176	242	162	346
293	35	225	139	181	243	166	347
297	36	230	140	185	244	170	348
301	37	233	141	188	245	173	349
304	38	236	142	191	246	176	350
307	39	239	143	194	247	179	351
10203		7733		2098		5597	TOTALS

MURDOCK DA PER A PER 0.01 CHANGE IN CF

CF 0.78		CF 0.85		CF 0.92		CF 0.95	
ALT	J	ALT	J	ALT	J	ALT	J
184	40	132	144	100	248	89	352
219	41	161	145	123	249	112	353
242	42	180	146	140	250	127	354
258	43	194	147	153	251	139	355
270	44	205	148	162	252	148	356
279	45	213	149	170	253	155	357
287	46	220	150	176	254	161	358
293	47	225	151	181	255	166	359
298	48	230	152	185	256	170	360
302	49	234	153	189	257	174	361
306	50	237	154	192	258	177	362
309	51	240	155	195	259	180	363
312	52	243	156	197	260	182	364
13760		10448		2163		7580	TOTALS
171	53	122	157	92	261	82	365
207	54	151	158	115	262	104	366
231	55	170	159	132	263	120	367
248	56	185	160	145	264	132	368
261	57	196	161	155	265	141	369
271	58	205	162	163	266	149	370
279	59	213	163	169	267	155	371
285	60	219	164	175	268	160	372
291	61	224	165	179	269	165	373
296	62	228	166	183	270	169	374
300	63	232	167	187	271	172	375
303	64	235	168	190	272	175	376
306	65	238	169	193	273	178	377
17207		13066		2077		9479	TOTALS
180	66	129	170	97	274	87	378
215	67	157	171	121	275	109	379
238	68	177	172	138	276	125	380
255	69	191	173	150	277	137	381
267	70	202	174	160	278	146	382
277	71	211	175	168	279	153	383
284	72	218	176	174	280	159	384
291	73	223	177	179	281	164	385
296	74	228	178	184	282	169	386
300	75	232	179	187	283	172	387
304	76	236	180	191	284	176	388
307	77	239	181	193	285	178	389
310	78	241	182	196	286	181	390
20730		15751		2137		11436	TOTALS
191	79	138	183	104	287	94	391

MURDOCK DA PER A PER 0.01 CHANGE IN CF

CF 0.78		CF 0.85		CF 0.92		CF 0.95	
ALT	J	ALT	J	ALT	J	ALT	J
225	80	166	184	128	288	116	392
248	81	185	185	145	289	132	393
263	82	199	186	157	290	143	394
275	83	209	187	166	291	152	395
284	84	217	188	173	292	159	396
291	85	224	189	179	293	165	397
297	86	229	190	184	294	169	398
301	87	233	191	188	295	173	399
305	88	237	192	192	296	177	400
309	89	240	193	195	297	180	401
312	90	243	194	198	298	182	402
314	91	246	195	200	299	185	403
24346		13518		2210		13463	TOTALS

205	92	149	196	114	300	103	404
239	93	177	197	138	301	125	405
260	94	196	198	154	302	140	406
274	95	208	199	165	303	151	407
284	96	218	200	174	304	160	408
293	97	225	201	181	305	166	409
299	98	231	202	186	306	171	410
304	99	236	203	191	307	176	411
308	100	240	204	194	308	179	412
312	101	243	205	198	309	182	413
315	102	246	206	200	310	185	414
317	103	249	207	203	311	187	415
320	104	251	208	205	312	189	416
28075		21387		2303		15578	TOTALS

IDENTIFICATION OF FULTON MIXES

Maximum Size of Stone.	Sand Size *	J for 1955 Series	J for 1961 Series					
			U = 290	U = 310	U = 330	U = 350	U = 370	U = 390
¾"	F	1 - 8	73 - 79	80 - 86	87 - 93	94 - 100	101 - 107	108 - 114
	M	9 - 16	115 - 121	122 - 128	129 - 135	136 - 142	143 - 149	150 - 156
	C	17 - 24	157 - 163	164 - 170	171 - 177	178 - 184	185 - 191	192 - 198
1"	F	25 - 32	**					
	M	33 - 40						
	C	41 - 48						
1½"	F	49 - 56	199 - 205	206 - 212	213 - 219	220 - 226	227 - 233	234 - 240
	M	57 - 64	241 - 247	248 - 254	255 - 261	262 - 268	269 - 275	276 - 282
	C	65 - 72	283 - 289	290 - 296	297 - 303	304 - 310	311 - 317	318 - 324

* F = fine sand, fineness modulus 2.0 to 2.2; M = medium sand, fineness modulus 2.6 to 2.8;
C = coarse sand, fineness modulus 2.9 to 3.2.

** There are no mixes of 1" maximum size in the 1961 series

ONE POCKET MIXES FULTON

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
82	275	365	816	129	167	216	560	1457	231	86	298	386	63	395	430	436	1
71	250	330	745	112	152	195	507	1470	221	95	299	385	63	378	431	437	2
65	225	300	684	103	136	178	465	1472	221	104	294	382	65	378	429	434	3
58	200	275	627	91	121	163	424	1480	216	114	286	384	64	370	421	427	4
53	185	255	587	84	112	151	395	1487	212	122	284	382	65	362	420	426	5
49	155	230	528	77	94	136	356	1485	217	136	264	383	65	372	403	408	6
45	145	215	499	71	88	127	334	1493	212	144	263	381	66	363	403	409	7
42	120	200	456	66	73	118	306	1493	217	158	238	387	61	371	375	381	8
82	305	340	821	129	185	201	564	1457	229	86	328	357	84	393	473	479	9
71	280	305	750	112	170	180	510	1470	219	94	333	354	87	376	479	485	10
65	250	280	689	103	152	166	468	1473	219	103	324	354	86	375	472	478	11
58	220	255	627	91	133	151	424	1479	216	114	315	356	85	369	463	469	12
53	205	235	587	84	124	139	395	1486	212	122	314	352	88	362	466	472	13
49	175	215	533	77	106	127	359	1486	215	134	296	355	86	369	449	455	14
45	160	200	499	71	97	118	334	1492	212	144	290	354	86	363	444	450	15
42	140	185	461	66	85	109	309	1493	215	156	275	355	86	367	431	437	16
82	320	320	816	129	194	189	561	1455	231	86	346	338	100	395	500	506	17
71	290	290	745	112	176	172	508	1468	221	95	346	338	100	378	500	506	18
65	260	260	679	103	158	154	462	1469	222	104	341	333	104	380	500	506	19
58	235	240	627	91	142	142	424	1478	216	114	336	335	103	369	495	501	20
53	215	225	587	84	130	133	395	1485	211	122	330	337	101	362	489	495	21
49	185	200	528	77	112	118	356	1483	217	135	315	332	105	372	481	487	22
45	170	190	499	71	103	112	335	1491	212	144	308	336	102	363	472	478	23
42	150	175	461	66	91	104	309	1492	214	156	294	335	102	367	462	468	24
82	280	410	866	129	170	243	590	1468	219	82	288	411	46	375	406	412	25
71	255	370	790	112	155	219	534	1480	210	90	290	410	47	359	408	414	26
65	225	335	719	103	136	198	485	1482	211	99	281	408	48	362	402	408	27
58	200	305	657	91	121	180	441	1489	207	109	275	409	48	355	396	402	28
53	185	280	612	84	112	166	410	1494	204	118	274	404	50	349	398	404	29
49	155	250	548	77	94	148	367	1492	210	131	256	403	51	360	383	388	30
45	140	240	519	71	85	142	346	1500	205	139	245	410	47	351	368	374	31
42	120	215	471	66	73	127	314	1498	211	153	231	405	50	361	358	364	32
82	310	385	871	129	188	228	593	1468	218	81	317	384	64	373	446	452	33
71	280	345	790	112	170	204	534	1479	210	90	318	382	65	359	448	454	34
65	245	315	719	103	148	186	486	1481	211	99	306	384	64	361	438	443	35
58	220	285	657	91	133	169	442	1488	207	109	302	382	65	355	436	442	36
53	200	265	612	84	121	157	410	1493	204	118	296	383	65	349	430	436	37
49	170	240	553	77	103	142	371	1493	209	130	278	383	64	357	415	420	38
45	150	225	514	71	91	133	343	1498	207	140	265	388	61	354	400	406	39
42	130	205	471	66	79	121	315	1497	211	153	251	386	63	361	388	394	40
82	330	365	871	129	200	216	593	1468	218	81	337	364	78	373	475	481	41
71	295	330	790	112	179	195	534	1479	210	90	335	366	77	359	472	478	42
65	260	300	719	103	158	178	486	1480	211	99	324	365	77	361	464	470	43
58	235	270	657	91	142	160	442	1487	207	109	322	362	80	354	465	471	44
53	215	250	612	84	130	148	410	1493	204	118	318	361	81	349	462	468	45
49	180	225	548	77	109	133	368	1490	210	131	297	362	80	360	444	450	46
45	165	210	514	71	100	124	343	1497	207	140	291	362	80	354	440	446	47
42	145	195	476	66	88	115	318	1498	208	152	277	363	79	357	426	432	48
82	290	460	926	129	176	272	625	1480	207	77	281	435	32	354	387	392	49
71	265	410	840	112	161	243	563	1491	199	86	285	431	35	340	393	398	50

ONE POCKET MIXES FULTON

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
65	225	370	754	103	136	219	506	1490	203	95	270	433	34	347	378	384	51
58	200	340	692	91	121	201	462	1498	198	104	262	435	32	339	370	376	52
53	185	310	642	84	112	183	427	1502	196	113	262	429	36	335	374	379	53
49	155	280	578	77	94	166	385	1501	201	125	244	430	35	344	356	362	54
45	135	260	534	71	82	154	355	1505	200	136	231	434	33	342	342	347	55
42	115	235	486	66	70	139	323	1504	205	149	216	430	35	351	329	334	56
82	310	440	926	129	188	260	626	1480	207	77	300	416	43	354	413	419	57
71	280	390	835	112	170	231	561	1489	200	86	303	412	46	342	418	424	58
65	240	355	754	103	145	210	506	1489	202	95	287	415	44	347	403	409	59
58	215	320	687	91	130	189	459	1496	199	105	284	412	45	341	402	408	60
53	200	295	642	84	121	175	428	1502	195	113	284	408	48	335	404	410	61
49	165	265	573	77	100	157	382	1499	202	126	262	410	47	346	384	389	62
45	150	250	539	71	91	148	358	1506	198	135	254	413	45	339	375	381	63
42	130	225	491	66	79	133	326	1504	203	148	241	408	48	347	366	372	64
82	330	420	926	129	200	249	626	1479	207	77	319	397	55	354	440	446	65
71	300	370	835	112	182	219	561	1489	200	86	324	390	59	342	448	454	66
65	260	340	759	103	158	201	509	1490	201	95	309	395	56	344	433	439	67
58	230	310	692	91	139	183	462	1496	198	104	301	397	55	339	426	432	68
53	210	285	642	84	127	169	428	1501	195	113	298	394	57	335	424	430	69
49	175	255	573	77	106	151	382	1498	202	126	277	395	57	346	407	413	70
45	160	235	534	71	97	139	355	1503	200	136	273	391	59	342	405	411	71
42	140	215	491	66	85	127	327	1504	203	148	260	390	60	347	394	400	72
85	440	570	1189	134	267	337	786	1512	170	61	339	429	36	292	436	442	73
72	360	485	1011	114	218	287	667	1516	170	72	327	430	35	291	426	432	74
63	300	420	877	99	182	249	578	1518	172	83	315	430	35	294	417	423	75
55	250	370	779	87	158	219	511	1523	170	94	308	428	36	290	413	419	76
50	220	330	694	79	133	195	456	1523	173	106	293	429	36	296	400	405	77
45	190	300	629	71	115	178	412	1527	172	117	280	431	35	295	388	393	78
41	170	270	575	65	103	160	376	1531	172	128	274	425	38	295	386	392	79
85	400	525	1104	134	242	311	735	1501	182	66	330	422	40	312	432	438	80
72	325	450	941	114	197	266	625	1506	182	77	315	426	37	311	419	425	81
63	275	385	817	99	167	228	542	1507	183	89	308	420	41	314	417	423	82
55	230	340	719	87	139	201	476	1512	182	101	293	423	39	312	404	409	83
50	200	310	654	79	121	183	432	1515	183	112	281	425	38	313	392	398	84
45	170	280	589	71	103	166	388	1519	183	124	266	427	37	313	378	383	85
41	155	250	540	65	94	148	355	1522	182	136	265	417	43	312	383	388	86
85	365	485	1029	134	221	287	690	1490	194	70	320	416	43	332	429	435	87
72	295	410	871	114	179	243	583	1494	195	83	307	416	43	333	418	424	88
63	245	360	762	99	148	213	509	1497	195	95	292	418	42	334	405	411	89
55	210	315	674	87	127	186	449	1502	193	107	284	415	44	331	400	406	90
50	175	285	604	79	106	169	402	1503	196	120	264	420	41	336	380	386	91
45	155	260	554	71	94	154	367	1510	193	131	256	419	41	331	373	379	92
41	130	235	500	65	79	139	331	1512	196	146	238	420	41	335	356	362	93
85	335	455	969	134	203	269	655	1480	205	74	310	411	46	351	424	430	94
72	270	385	821	114	164	228	553	1484	205	87	296	412	46	351	412	418	95
63	225	335	717	99	136	198	482	1487	206	100	283	411	46	353	402	408	96
55	190	295	634	87	115	175	425	1493	204	114	271	411	46	350	392	397	97
50	160	265	569	79	97	157	381	1494	207	127	255	412	46	354	376	382	98
45	135	240	514	71	82	142	343	1499	207	141	239	414	44	354	360	366	99
41	120	215	470	65	73	127	313	1503	207	154	233	407	49	354	358	364	100

ONE POCKET MIXES FULTON

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
85	310	420	909	134	188	249	619	1469	217	78	304	402	52	371	425	431	101
72	250	355	771	114	152	210	523	1473	217	92	290	401	52	371	413	419	102
63	210	305	672	99	127	180	455	1476	218	106	280	396	55	374	408	414	103
55	175	270	594	87	106	160	401	1482	216	120	265	399	54	371	393	399	104
50	145	245	534	79	88	145	360	1484	219	134	244	403	51	375	372	377	105
45	125	220	484	71	76	130	325	1489	218	148	233	400	53	374	362	368	106
41	105	205	445	65	64	121	298	1494	217	162	214	407	48	372	339	344	107
85	295	385	859	134	179	228	589	1459	228	82	304	387	62	390	434	440	108
72	235	325	726	114	142	192	496	1462	229	97	287	387	61	392	420	426	109
63	195	280	632	99	118	166	431	1465	230	112	274	384	64	394	411	416	110
55	160	250	559	87	97	148	380	1472	228	127	255	389	60	391	390	396	111
50	135	220	499	79	82	130	339	1472	233	142	241	384	64	398	380	386	112
45	110	205	454	71	67	121	307	1478	231	157	217	395	56	396	349	355	113
41	95	185	415	65	58	109	280	1483	231	172	206	391	59	395	339	345	114
85	495	515	1189	134	300	305	787	1511	170	61	381	387	61	292	490	495	115
72	405	435	1006	114	245	257	665	1514	171	73	369	387	61	293	482	488	116
63	340	380	877	99	206	225	578	1516	172	83	356	389	60	294	472	478	117
55	295	335	779	87	179	198	512	1522	169	94	349	387	62	290	468	474	118
50	255	300	699	79	155	178	459	1522	172	105	337	387	62	294	459	465	119
45	225	270	634	71	136	160	415	1527	171	116	328	385	63	293	455	461	120
41	195	245	575	65	118	145	376	1529	172	128	314	386	63	294	443	449	121
85	450	475	1104	134	273	281	736	1500	182	65	371	382	65	312	486	492	122
72	370	400	936	114	224	237	623	1503	182	77	360	380	66	312	481	487	123
63	310	350	817	99	188	207	543	1506	183	89	346	382	65	314	470	476	124
55	265	310	724	87	161	183	479	1512	181	101	335	383	64	310	461	467	125
50	225	280	649	79	136	166	429	1512	184	112	318	386	62	315	446	451	126
45	195	255	589	71	118	151	388	1517	183	124	304	389	61	313	433	439	127
41	170	250	555	65	103	148	364	1525	178	132	283	407	49	304	405	411	128
85	415	440	1034	134	252	260	694	1490	193	69	362	375	70	331	485	491	129
72	335	375	876	114	203	222	587	1493	194	82	346	378	68	331	472	478	130
63	280	325	762	99	170	192	510	1495	195	95	333	377	68	334	463	469	131
55	240	285	674	87	145	169	449	1501	193	107	324	376	70	331	457	463	132
50	205	255	604	79	124	151	402	1502	196	120	309	375	70	336	446	452	133
45	175	235	549	71	106	139	364	1507	195	132	291	382	65	334	427	433	134
41	155	215	505	65	94	127	334	1512	194	144	281	381	66	331	419	425	135
85	375	410	964	134	227	243	652	1478	206	74	349	372	72	352	478	484	136
72	310	345	821	114	188	204	554	1483	205	87	339	369	75	351	473	479	137
63	255	300	712	99	155	178	480	1485	207	100	322	370	74	355	459	465	138
55	215	265	629	87	130	157	422	1490	206	114	309	372	73	352	448	454	139
50	185	235	564	79	112	139	378	1491	208	127	296	368	76	357	440	446	140
45	160	215	514	71	97	127	343	1497	207	140	282	371	73	354	427	433	141
41	140	195	470	65	85	115	313	1501	207	154	271	369	75	354	418	424	142
85	350	375	904	134	212	222	615	1467	218	78	344	360	81	372	483	489	143
72	285	315	766	114	173	186	521	1471	218	93	332	358	83	373	475	481	144
63	240	275	672	99	145	163	456	1475	218	106	319	357	84	373	466	472	145
55	200	240	589	87	121	142	398	1479	218	121	304	357	84	373	455	461	146
50	170	220	534	79	103	130	360	1482	219	134	286	361	80	375	436	442	147
45	145	200	484	71	88	118	325	1487	218	148	270	364	79	373	420	426	148
41	125	180	440	65	76	107	295	1491	219	163	257	361	81	375	410	416	149
85	335	345	859	134	203	204	589	1457	227	82	344	346	93	389	493	499	150

ONE POCKET MIXES FULTON

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
72	265	290	721	114	161	172	494	1460	230	98	325	347	92	394	477	483	151
63	225	250	632	99	136	148	432	1463	230	112	316	343	96	394	474	480	152
55	185	220	554	87	112	130	377	1469	230	128	297	345	94	394	457	463	153
50	155	195	494	79	94	115	336	1469	234	143	279	343	95	401	443	449	154
45	130	180	449	71	79	107	304	1475	233	158	259	350	90	399	419	425	155
41	115	165	415	65	70	98	280	1481	231	172	249	348	91	395	411	417	156
85	525	485	1189	134	318	287	787	1510	170	61	404	364	78	291	520	526	157
72	430	410	1006	114	261	243	665	1513	171	72	392	365	78	292	512	518	158
63	360	360	977	99	218	213	579	1515	172	83	377	368	75	294	500	506	159
55	315	315	779	87	191	186	512	1521	169	94	373	364	78	290	500	506	160
50	270	285	699	79	164	169	459	1522	172	105	356	367	76	294	486	492	161
45	240	250	629	71	145	148	413	1525	172	117	353	359	83	295	490	496	162
41	210	230	575	65	127	136	376	1528	172	128	338	362	80	294	477	483	163
85	480	450	1109	134	291	266	739	1500	181	65	393	360	81	310	516	522	164
72	395	380	941	114	239	225	626	1503	181	77	382	359	82	311	510	516	165
63	330	325	912	99	200	192	540	1504	184	89	370	356	84	315	504	510	166
55	285	290	724	87	173	172	479	1511	181	101	360	358	83	310	496	502	167
50	215	260	649	79	148	154	429	1511	184	112	346	358	83	314	485	491	168
45	210	235	584	71	127	139	385	1515	184	125	330	361	81	315	472	478	169
41	135	220	540	65	112	130	355	1520	182	136	316	367	76	312	457	463	170
85	440	410	1029	134	267	243	692	1488	194	70	386	351	89	332	518	524	171
72	360	350	876	114	218	207	587	1492	193	82	372	353	87	331	507	513	172
63	300	305	762	99	182	180	510	1495	195	95	357	354	86	334	496	502	173
55	255	270	674	87	155	160	449	1500	193	107	344	356	85	331	486	492	174
50	220	240	604	79	133	142	402	1501	196	120	331	353	87	335	478	484	175
45	190	220	549	71	115	130	364	1506	195	132	316	357	84	333	463	469	176
41	170	200	505	65	103	118	334	1511	193	144	308	354	86	331	459	465	177
85	400	380	959	134	242	225	650	1476	206	74	373	346	93	353	513	519	178
72	330	325	821	114	200	192	554	1482	205	87	361	347	92	351	504	510	179
63	275	280	712	99	167	166	480	1484	207	100	347	345	94	354	495	502	180
55	235	250	634	87	142	148	425	1491	204	113	335	348	91	349	485	491	181
50	200	225	569	79	121	133	381	1492	207	126	318	349	90	354	471	477	182
45	175	200	514	71	106	118	344	1496	207	140	309	344	94	354	467	473	183
41	150	180	465	65	91	107	310	1499	208	155	293	343	95	357	455	461	184
85	370	350	899	134	224	207	614	1465	218	79	365	338	100	374	514	520	185
72	310	300	776	114	188	178	527	1472	215	91	356	337	101	369	508	514	186
63	260	255	672	99	158	151	456	1474	218	106	346	331	106	373	505	511	187
55	220	225	594	87	133	133	401	1480	216	120	332	332	106	370	494	500	188
50	185	205	534	79	112	121	360	1481	219	134	311	336	101	375	474	480	189
45	160	135	484	71	97	109	326	1486	218	148	298	336	101	373	464	470	190
41	140	170	445	65	85	101	298	1492	217	162	284	337	101	371	452	458	191
85	355	315	849	134	215	186	584	1454	230	83	369	319	118	393	530	536	192
72	290	270	726	114	176	160	497	1460	228	97	353	321	116	391	518	524	193
63	240	230	627	99	145	136	429	1461	232	112	339	317	120	396	511	517	194
55	200	205	554	87	121	121	377	1468	230	128	321	321	115	393	494	500	195
50	175	185	504	79	106	109	343	1471	230	141	310	320	117	394	486	492	196
45	145	170	454	71	88	101	308	1476	231	157	286	327	110	395	460	466	197
41	125	155	415	65	76	92	280	1480	231	172	270	327	110	395	446	452	198
85	350	660	1189	134	212	391	785	1515	171	61	270	498	3	292	347	352	199
72	285	555	1006	114	173	328	663	1518	171	73	261	495	4	293	339	345	200

ONE POCKET MIXES FULTON

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
63	240	480	377	99	145	284	577	1520	172	84	252	492	5	295	333	339	201
55	200	430	779	87	121	254	511	1526	170	94	237	498	3	291	317	323	202
50	170	385	699	79	103	228	458	1527	172	105	225	498	3	295	306	311	203
45	140	350	629	71	85	207	411	1530	173	117	206	504	1	296	286	291	204
41	125	315	575	65	76	186	375	1533	172	129	202	497	3	295	284	289	205
85	315	610	1104	134	191	361	734	1504	183	66	260	492	5	313	341	346	206
72	260	520	346	114	158	308	627	1509	181	77	251	491	6	310	333	339	207
63	210	445	312	99	127	263	538	1509	185	90	237	489	7	316	321	326	208
55	175	395	719	87	106	234	475	1515	183	102	223	492	5	313	307	312	209
50	150	355	549	79	91	210	428	1516	184	113	212	491	6	315	297	302	210
45	125	320	584	71	76	189	384	1520	185	125	197	493	5	316	281	286	211
41	110	295	540	65	67	175	354	1525	183	136	188	493	5	313	272	276	212
85	280	570	1029	134	170	337	689	1493	194	70	246	489	6	333	329	335	213
72	230	480	376	114	139	284	585	1497	194	82	238	485	8	332	324	329	214
63	190	415	762	99	115	246	508	1499	195	95	227	483	9	335	314	319	215
55	160	365	674	87	97	216	448	1505	194	108	217	482	10	332	305	310	216
50	130	330	504	79	79	195	401	1506	197	120	196	487	8	337	283	288	217
45	110	300	549	71	67	178	363	1511	195	133	183	489	7	334	268	273	218
41	95	275	505	65	58	163	333	1516	194	145	173	488	7	332	257	261	219
85	260	525	964	134	158	311	650	1482	206	74	242	478	12	353	331	337	220
72	215	445	826	114	130	263	555	1487	204	87	235	474	13	350	326	331	221
63	170	385	712	99	103	228	478	1488	208	101	215	476	12	356	306	311	222
55	140	340	629	87	85	201	421	1494	206	114	202	478	11	353	292	297	223
50	115	305	564	79	70	180	377	1495	209	128	185	476	11	358	274	279	224
45	100	275	514	71	61	163	342	1501	207	141	177	475	13	355	267	271	225
41	85	250	470	65	52	148	312	1505	207	154	165	474	13	354	254	258	226
85	245	480	904	134	148	284	615	1471	218	78	242	462	19	373	338	343	227
72	190	410	766	114	115	243	520	1474	219	93	222	467	16	374	317	322	228
63	155	355	667	99	94	210	452	1477	220	107	208	465	17	377	304	309	229
55	130	315	594	87	79	186	400	1485	217	120	197	466	17	371	292	297	230
50	105	285	534	79	64	169	359	1486	219	134	177	469	15	376	269	274	231
45	90	255	484	71	55	151	325	1491	219	148	168	465	17	374	261	266	232
41	75	235	445	65	45	139	297	1496	217	162	153	468	16	372	242	246	233
85	225	450	354	134	136	266	585	1460	229	82	233	455	22	392	333	339	234
72	180	380	726	114	109	225	496	1465	229	97	220	454	23	392	321	327	235
63	140	330	627	99	85	195	428	1466	232	113	198	457	21	398	298	303	236
55	115	290	554	87	70	172	376	1473	231	126	185	456	22	395	284	289	237
50	95	260	499	79	58	154	338	1474	233	142	170	455	22	399	268	272	238
45	80	235	454	71	48	139	307	1480	231	157	158	453	23	396	254	259	239
41	65	215	415	65	39	127	279	1485	231	172	141	455	22	396	232	236	240
85	405	605	1189	134	245	358	786	1513	171	61	312	456	22	292	401	407	241
72	330	510	1006	114	200	302	664	1516	171	73	301	455	22	293	393	399	242
63	280	440	977	99	170	260	578	1518	172	83	294	451	24	294	389	395	243
55	240	390	779	87	145	231	511	1524	170	94	285	451	24	291	381	387	244
50	200	355	699	79	121	210	458	1525	172	105	264	458	21	295	360	366	245
45	170	320	629	71	103	189	412	1528	172	117	250	460	20	295	347	352	246
41	150	285	570	65	91	169	372	1531	174	129	244	453	23	297	345	350	247
85	370	555	1104	134	224	328	735	1502	182	66	305	447	26	312	400	406	248
72	305	470	941	114	185	278	625	1506	182	77	296	445	27	311	394	399	249
63	245	410	312	99	148	243	539	1507	184	89	276	450	25	316	374	380	250

ONE POCKET MIXES FULTON

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
55	210	360	719	87	127	213	475	1513	183	101	268	448	26	312	368	374	251
50	180	325	649	79	109	192	428	1515	184	112	255	449	25	315	356	362	252
45	155	295	589	71	94	175	388	1519	183	124	242	450	25	313	344	350	253
41	130	270	535	65	79	160	351	1522	184	137	224	455	22	315	325	330	254
85	335	515	1029	134	203	305	690	1491	194	70	294	442	29	333	394	400	255
72	270	440	976	114	164	260	586	1496	194	82	279	444	28	332	380	386	256
63	225	380	762	99	136	225	509	1498	195	95	268	442	29	334	372	378	257
55	190	335	674	87	115	198	448	1503	193	108	257	442	29	331	362	367	258
50	160	300	604	79	97	178	402	1504	196	120	242	442	29	336	348	353	259
45	135	275	549	71	82	163	364	1509	195	133	225	447	26	334	329	335	260
41	115	250	500	65	70	148	330	1513	196	146	211	448	26	335	315	320	261
85	305	480	964	134	185	284	651	1481	206	74	284	436	32	352	389	394	262
72	245	405	816	114	148	240	550	1484	206	88	270	436	32	354	377	383	263
63	200	355	712	99	121	210	479	1487	207	101	253	439	31	355	360	366	264
55	170	310	629	87	103	183	421	1493	206	114	245	435	32	352	354	360	265
50	140	230	564	79	85	166	378	1494	209	128	225	439	31	358	333	339	266
45	120	255	514	71	73	151	343	1500	207	141	212	440	30	354	320	325	267
41	105	230	470	65	64	136	313	1504	207	154	204	435	32	354	313	319	268
85	280	445	904	134	170	263	615	1469	218	78	276	428	36	373	386	392	269
72	225	375	766	114	136	222	520	1473	218	93	262	427	37	374	375	381	270
63	190	325	672	99	115	192	455	1477	218	106	253	423	39	374	369	375	271
55	160	235	594	87	97	169	401	1483	217	120	242	421	40	371	360	365	272
50	135	255	534	79	82	151	360	1484	219	134	227	419	41	375	346	352	273
45	110	235	484	71	67	139	325	1490	218	148	205	428	36	374	319	324	274
41	95	215	145	65	58	127	298	1495	217	162	193	427	37	372	306	312	275
85	265	410	354	134	161	243	565	1459	229	82	274	414	44	392	393	398	276
72	210	345	721	114	127	204	493	1462	230	98	258	414	44	394	378	384	277
63	170	300	527	99	103	178	423	1465	232	113	241	415	44	397	362	367	278
55	145	265	559	87	88	157	380	1473	228	127	232	413	45	391	354	359	279
50	120	235	499	79	73	139	339	1473	233	142	215	410	47	398	338	343	280
45	100	215	454	71	61	127	307	1479	231	157	197	414	44	396	317	323	281
41	35	195	415	65	52	115	280	1483	231	172	184	412	45	396	304	309	282
85	435	575	1189	134	264	340	786	1512	171	61	335	433	34	292	431	437	283
72	360	485	1011	114	218	287	667	1516	170	72	327	430	35	291	426	432	284
63	305	420	382	99	185	249	581	1518	171	83	318	428	36	293	421	427	285
55	260	370	779	87	158	219	511	1523	170	94	308	428	36	290	413	419	286
50	220	335	699	79	133	198	459	1524	172	105	291	432	34	294	396	402	287
45	190	300	629	71	115	178	412	1527	172	117	280	431	35	295	388	393	288
41	165	275	575	65	100	163	376	1531	172	128	266	433	33	295	375	381	289
85	400	530	1109	134	242	314	738	1502	182	65	328	425	38	311	430	436	290
72	325	450	941	114	197	266	625	1506	182	77	315	426	37	311	419	425	291
63	270	390	917	99	164	231	542	1507	183	89	302	426	38	314	409	415	292
55	235	345	729	87	142	204	482	1514	180	100	296	424	39	308	405	411	293
50	195	310	649	79	118	183	429	1514	184	112	276	428	36	315	386	392	294
45	170	280	589	71	103	166	388	1519	183	124	266	427	37	313	378	383	295
41	150	250	535	65	91	148	352	1521	184	137	259	421	41	315	375	381	296
85	365	490	1034	134	221	290	693	1491	193	70	319	418	42	331	427	433	297
72	295	415	876	114	179	246	586	1495	194	82	305	419	42	332	415	421	298
63	245	360	762	99	148	213	509	1497	195	95	292	418	42	334	405	411	299
55	205	320	674	87	124	189	449	1503	193	107	277	422	40	331	390	396	300

ONE POCKET MIXES   FULTON

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
50	175	285	604	79	106	169	402	1503	196	120	264	420	41	336	380	386	301
45	150	260	549	71	91	154	364	1509	195	132	250	423	39	334	366	371	302
41	130	235	500	65	79	139	331	1512	196	146	238	420	41	335	356	362	303
85	330	455	964	134	200	269	651	1480	206	74	307	413	45	352	420	426	304
72	270	385	321	114	164	228	553	1484	205	87	296	412	46	351	412	418	305
63	220	335	712	99	133	198	479	1486	207	101	278	414	45	355	396	402	306
55	185	295	629	87	112	175	422	1492	206	114	266	414	44	352	385	391	307
50	155	255	564	79	94	157	378	1493	209	128	249	415	44	357	369	375	308
45	135	240	514	71	82	142	343	1499	207	141	239	414	44	354	360	366	309
41	115	220	470	65	70	130	313	1503	207	154	223	416	43	354	343	349	310
85	305	420	904	134	185	249	616	1468	218	78	300	404	51	373	421	427	311
72	250	355	771	114	152	210	523	1473	217	92	290	401	52	371	413	419	312
63	210	305	572	99	127	180	455	1476	218	106	280	396	55	374	408	414	313
55	175	270	594	87	106	160	401	1482	216	120	265	399	54	371	393	399	314
50	150	240	534	79	91	142	360	1483	219	134	253	394	57	375	385	390	315
45	125	220	484	71	76	130	325	1489	218	148	233	400	53	374	362	368	316
41	105	200	440	65	64	118	295	1492	219	163	216	401	52	375	344	350	317
85	290	385	954	134	176	228	585	1458	229	82	300	389	60	392	430	436	318
72	230	325	721	114	139	192	493	1461	230	98	283	390	60	394	414	420	319
63	135	285	637	99	118	169	434	1466	229	111	272	388	61	392	406	412	320
55	160	250	559	87	97	148	380	1472	228	127	255	389	60	391	390	396	321
50	135	225	504	79	82	133	342	1474	231	141	239	389	60	395	375	381	322
45	110	205	454	71	67	121	307	1478	231	157	217	395	56	396	349	355	323
41	95	135	415	65	58	109	280	1483	231	172	206	391	59	395	339	345	324

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
1	87	681	2	76	617	3	69	558	4	62	505	5	56	468	6	52	410
7	48	383	8	45	340	9	87	686	10	76	622	11	69	564	12	62	505
13	56	468	14	52	415	15	48	383	16	45	346	17	87	681	18	76	617
19	69	553	20	62	505	21	56	468	22	52	410	23	48	383	24	45	346
25	87	734	26	76	665	27	69	596	28	62	537	29	56	495	30	52	431
31	48	404	32	45	356	33	87	739	34	76	665	35	69	596	36	62	537
37	56	495	38	52	436	39	48	399	40	45	356	41	87	739	42	76	665
43	69	596	44	62	537	45	56	495	46	52	431	47	48	399	48	45	362
49	87	798	50	76	718	51	69	633	52	62	574	53	56	527	54	52	463
55	48	420	56	45	372	57	87	798	58	76	713	59	69	633	60	62	569
61	56	527	62	52	457	63	48	426	64	45	378	65	87	798	66	76	713
67	69	638	68	62	574	69	56	527	70	52	457	71	48	420	72	45	378
73	90	1074	74	77	899	75	67	766	76	59	670	77	53	585	78	48	521
79	44	468	80	90	984	81	77	824	82	67	702	83	59	606	84	53	543
85	48	479	86	44	431	87	90	904	88	77	750	89	67	644	90	59	558
91	53	489	92	48	441	93	44	388	94	90	840	95	77	697	96	67	596
97	59	516	98	53	452	99	48	399	100	44	356	101	90	777	102	77	644
103	67	548	104	59	473	105	53	415	106	48	367	107	44	330	108	90	723
109	77	596	110	67	505	111	59	436	112	53	378	113	48	335	114	44	298
115	90	1074	116	77	894	117	67	766	118	59	670	119	53	590	120	48	527
121	44	468	122	90	984	123	77	819	124	67	702	125	59	612	126	53	537
127	48	479	128	44	426	129	90	910	130	77	755	131	67	644	132	59	558
133	53	489	134	48	436	135	44	394	136	90	835	137	77	697	138	67	590
139	59	511	140	53	447	141	48	399	142	44	356	143	90	771	144	77	638
145	67	548	146	59	468	147	53	415	148	48	367	149	44	324	150	90	723
151	77	590	152	67	505	153	59	431	154	53	372	155	48	330	156	44	298
157	90	1074	158	77	894	159	67	766	160	59	670	161	53	590	162	48	521
163	44	468	164	90	989	165	77	824	166	67	697	167	59	612	168	53	537
169	46	473	170	44	431	171	90	904	172	77	755	173	67	644	174	59	558
175	53	489	176	48	436	177	44	394	178	90	830	179	77	697	180	67	590
181	59	516	182	53	452	183	48	399	184	44	351	185	90	766	186	77	649
187	67	548	188	59	473	189	53	415	190	48	367	191	44	330	192	90	713
193	77	596	194	67	500	195	59	431	196	53	383	197	48	335	198	44	298
199	90	1074	200	77	894	201	67	766	202	59	670	203	53	590	204	48	521
205	44	468	206	90	984	207	77	830	208	67	697	209	59	606	210	53	537
211	48	473	212	44	431	213	90	904	214	77	755	215	67	644	215	59	558
217	53	489	218	48	436	219	44	394	220	90	835	221	77	702	222	67	590
223	59	511	224	53	447	225	48	399	226	44	356	227	90	771	228	77	638
229	67	543	230	59	473	231	53	415	232	48	367	233	44	330	234	90	718
235	77	596	236	67	500	237	59	431	238	53	378	239	48	335	240	44	298
241	90	1074	242	77	894	243	67	766	244	59	670	245	53	590	246	48	521
247	44	463	248	90	984	249	77	824	250	67	697	251	59	606	252	53	537
253	48	479	254	44	426	255	90	904	256	77	755	257	67	644	258	59	558
259	53	489	260	48	436	261	44	388	262	90	835	263	77	691	264	67	590
265	59	511	266	53	447	267	48	399	268	44	356	269	90	771	270	77	638
271	67	548	272	59	473	273	53	415	274	48	367	275	44	330	276	90	718
277	77	590	278	67	500	279	59	436	280	53	378	281	48	335	282	44	298
283	90	1074	284	77	899	285	67	771	286	59	670	287	53	590	288	48	521
289	44	468	290	90	989	291	77	824	292	67	702	293	59	617	294	53	537
295	48	479	296	44	426	297	90	910	298	77	755	299	67	644	300	59	556
301	53	489	302	48	436	303	44	388	304	90	835	305	77	697	306	67	590
307	59	511	308	53	447	309	48	399	310	44	356	311	90	771	312	77	644
313	67	548	314	59	473	315	53	415	316	48	367	317	44	324	318	90	718
319	77	590	320	67	511	321	59	436	322	53	383	323	48	335	324	44	298

IDENTIFICATION OF AMERICAN CONCRETE INSTITUTE MIXES WITH NATURAL SAND

Max. Size of Stone	J for Rounded Stone					J for Angular Stone				
	Fineness Modulus of Sand					Fineness Modulus of Sand				
	2.00	2.25	2.50	2.75	3.00	2.00	2.25	2.50	2.75	3.00
½	1 - 8	57 - 64	113 - 120	169 - 176	225 - 232	281 - 288	337 - 344	393 - 400	449 - 456	505 - 512
¾	9 - 16	65 - 72	121 - 128	177 - 184	233 - 240	289 - 296	345 - 352	401 - 408	457 - 464	513 - 520
1	17 - 24	73 - 80	129 - 136	185 - 192	241 - 248	297 - 304	353 - 360	409 - 416	465 - 472	521 - 528
1½	25 - 32	81 - 88	137 - 144	193 - 200	249 - 256	305 - 312	361 - 368	417 - 424	473 - 480	529 - 536
2	33 - 40	89 - 96	145 - 152	201 - 208	257 - 264	313 - 320	369 - 376	425 - 432	481 - 488	537 - 544
3	41 - 48	97 - 104	153 - 160	209 - 216	265 - 272	321 - 328	377 - 384	433 - 440	489 - 496	545 - 552
6	49 - 56	105 - 112	161 - 168	217 - 224	273 - 280	329 - 336	385 - 392	441 - 448	497 - 504	553 - 560

IDENTIFICATION OF AMERICAN CONCRETE INSTITUTE MIXES WITH CRUSHED SAND

Max. Size of Stone	J for Rounded Stone					J for Angular Stone				
	Fineness Modulus of Sand					Fineness Modulus of Sand				
	2.00	2.25	2.50	2.75	3.00	2.00	2.25	2.50	2.75	3.00
½	561 - 568	617 - 624	673 - 680	729 - 736	785 - 792	841 - 848	897 - 904	953 - 960	1009 - 1016	1065 - 1072
¾	569 - 576	625 - 632	681 - 688	737 - 744	793 - 800	849 - 856	905 - 912	961 - 968	1017 - 1024	1073 - 1080
1	577 - 584	633 - 640	689 - 696	745 - 752	801 - 808	857 - 864	913 - 920	969 - 976	1025 - 1032	1081 - 1088
1½	585 - 592	641 - 648	697 - 704	753 - 760	809 - 816	865 - 872	921 - 928	977 - 984	1033 - 1040	1089 - 1096
2	593 - 600	649 - 656	705 - 712	761 - 768	817 - 824	873 - 880	929 - 936	985 - 992	1041 - 1048	1097 - 1104
3	601 - 608	657 - 664	713 - 720	769 - 776	825 - 832	881 - 888	937 - 944	993 - 1000	1049 - 1056	1105 - 1112
6	609 - 616	665 - 672	721 - 728	777 - 784	833 - 840	889 - 896	945 - 952	1001 - 1008	1057 - 1064	1113 - 1120

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

1033

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	
41	161	205	501	65	98	121	332	1509	196	145	294	365	78	336	441	447	1
46	188	229	557	73	114	135	370	1504	196	130	307	366	77	336	451	457	2
50	210	248	601	79	127	146	400	1501	196	120	317	366	77	336	459	465	3
55	238	270	656	86	144	160	438	1498	196	110	329	365	78	336	469	475	4
58	261	287	700	92	158	170	468	1496	196	103	338	363	79	336	477	483	5
63	291	307	756	99	177	182	506	1494	196	95	349	360	82	336	487	493	6
67	316	323	800	105	192	191	536	1492	196	90	357	357	84	336	495	501	7
71	342	338	844	111	207	200	566	1490	196	85	365	353	87	336	503	509	8
41	161	251	547	65	97	148	359	1522	182	134	271	413	45	311	391	397	9
46	187	280	607	73	113	166	400	1518	182	121	284	414	44	311	401	407	10
50	209	303	656	79	127	179	433	1516	182	111	293	414	44	311	409	415	11
55	238	330	716	86	144	195	473	1513	182	102	304	412	45	311	419	425	12
58	261	351	764	92	158	208	506	1511	182	95	313	410	47	311	427	433	13
63	292	376	825	99	177	223	547	1508	182	88	323	407	49	311	437	443	14
67	317	396	873	105	192	234	580	1507	182	83	331	404	51	311	445	451	15
71	343	414	922	111	208	245	612	1505	182	79	339	401	53	311	453	459	16
41	147	285	567	65	89	168	371	1529	176	130	241	454	23	301	341	347	17
46	172	318	630	73	104	188	413	1525	176	117	252	455	22	301	351	357	18
50	193	344	681	79	117	204	447	1522	176	108	261	455	22	301	359	365	19
55	219	375	743	86	133	222	489	1519	176	99	272	454	23	301	369	375	20
58	242	400	794	92	146	236	523	1517	176	92	280	452	24	301	377	383	21
63	271	429	856	99	164	254	565	1515	176	85	290	449	25	301	387	393	22
67	294	451	906	105	178	267	599	1513	176	80	298	446	27	301	395	401	23
71	319	473	957	111	193	280	633	1512	176	76	306	442	29	301	403	409	24
41	114	333	612	65	87	197	398	1540	164	121	219	496	4	281	301	307	25
46	168	372	680	73	102	220	443	1536	164	109	230	497	3	281	311	317	26
50	189	402	735	79	114	238	479	1533	164	101	239	497	3	281	319	325	27
55	215	439	803	86	131	260	524	1531	164	92	249	495	4	281	329	335	28
58	236	457	857	92	144	276	560	1529	164	86	257	493	5	281	337	343	29
63	266	501	925	99	162	297	606	1527	164	80	267	490	6	281	347	353	30
67	291	528	979	105	176	312	642	1525	164	75	274	487	8	281	355	361	31
71	315	554	1033	111	191	328	678	1524	164	71	282	483	9	281	363	369	32
41	140	375	651	65	85	222	420	1548	155	115	202	528	-9	266	272	277	33
46	154	419	723	73	99	248	468	1544	155	103	213	529	-9	266	282	287	34
50	184	453	781	79	112	268	506	1542	155	95	221	529	-9	266	290	295	35
55	211	494	853	86	128	292	554	1540	155	87	231	527	-8	266	299	305	36
58	233	525	911	92	141	311	592	1538	155	81	239	525	-8	266	307	313	37
63	262	564	983	99	159	334	640	1536	155	75	248	521	-6	266	317	323	38
67	286	594	1041	105	173	351	678	1534	155	71	256	518	-5	266	325	331	39
71	311	623	1098	111	189	369	716	1533	155	67	263	514	-4	266	333	339	40
41	135	423	694	65	82	250	446	1556	146	108	184	562	-20	251	242	247	41
46	159	472	771	73	96	279	496	1553	146	97	194	562	-21	251	252	257	42
50	179	510	832	79	108	302	537	1551	146	90	202	562	-20	251	260	265	43
55	205	556	910	86	124	329	587	1548	146	82	212	560	-20	251	270	275	44
58	227	592	971	92	138	350	628	1547	146	77	219	557	-19	251	278	283	45
63	256	635	1048	99	155	376	679	1545	146	71	229	554	-18	251	288	293	46
67	280	669	1110	105	170	396	719	1543	146	67	236	550	-17	251	295	301	47
71	306	701	1171	111	185	415	760	1542	146	63	244	546	-15	251	303	309	48
41	127	534	797	65	77	316	507	1573	129	95	153	624	-38	220	193	197	49
46	151	594	886	73	92	352	564	1570	129	85	162	624	-38	220	203	207	50

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%		T	U	SW%	SV%	J
50	171	642	957	79	104	380	610	1568	129	79	170	622	-	38	220	210	215	51
55	198	699	1045	86	120	414	668	1566	129	72	179	620	-	37	220	220	225	52
58	220	744	1110	92	133	440	714	1564	129	68	187	617	-	37	220	228	233	53
63	250	799	1205	99	151	473	771	1562	129	62	196	613	-	35	220	238	243	54
67	274	841	1276	105	166	498	817	1561	129	59	203	609	-	34	220	246	251	55
71	300	882	1347	111	182	522	863	1560	129	56	211	605	-	33	220	254	259	56
41	166	200	501	65	100	118	332	1508	196	145	302	356		84	336	453	459	57
46	193	224	557	73	117	132	370	1504	196	130	316	358		83	336	463	469	58
50	215	242	601	79	130	143	400	1501	196	120	326	357		84	336	471	477	59
55	244	263	656	86	148	156	438	1498	196	110	338	356		85	336	481	487	60
58	268	280	700	92	162	166	468	1496	196	103	347	354		86	336	489	495	61
63	299	300	756	99	181	177	506	1493	196	95	358	351		89	336	499	505	62
67	324	315	800	105	196	186	536	1491	196	90	366	348		92	336	507	513	63
71	350	329	844	111	212	195	566	1490	196	85	374	344		94	336	515	521	64
41	155	245	547	65	101	145	359	1522	182	134	280	404		50	311	403	409	65
46	183	274	607	73	117	162	400	1518	182	121	292	405		50	311	413	419	66
50	216	296	656	79	131	175	433	1515	182	111	302	405		50	311	421	427	67
55	245	323	716	86	148	191	473	1512	182	102	313	403		51	311	431	437	68
58	269	343	764	92	163	203	506	1510	182	95	322	401		52	311	439	445	69
63	300	368	825	99	182	218	547	1508	182	88	332	398		54	311	449	455	70
67	326	387	873	105	197	229	580	1506	182	83	340	395		56	311	457	463	71
71	352	405	921	111	213	240	612	1505	182	79	348	391		59	311	465	471	72
41	153	279	567	65	93	165	371	1528	176	130	249	445		27	301	354	359	73
46	178	312	630	73	108	185	413	1524	176	117	261	447		26	301	363	369	74
50	199	337	680	79	121	200	447	1522	176	108	270	446		27	301	371	377	75
55	227	368	743	86	137	218	489	1519	176	99	281	445		27	301	381	387	76
58	250	392	793	92	151	232	523	1517	176	92	289	443		28	301	389	395	77
63	279	420	856	99	169	249	565	1515	176	85	299	440		30	301	399	405	78
67	304	442	906	105	184	261	599	1513	176	80	307	437		32	301	407	413	79
71	329	463	956	111	199	274	633	1512	176	76	315	433		34	301	415	421	80
41	150	327	612	65	91	194	398	1539	164	121	228	487		8	281	314	319	81
46	175	365	680	73	106	216	443	1536	164	109	239	488		7	281	324	329	82
50	196	395	735	79	119	234	479	1533	164	101	248	488		7	281	332	337	83
55	223	431	802	86	135	255	524	1530	164	92	258	486		8	281	342	347	84
58	246	458	857	92	149	271	560	1529	164	86	266	484		9	281	350	355	85
63	276	492	925	99	167	291	606	1527	164	80	276	480		10	281	359	365	86
67	301	518	979	105	182	306	642	1525	164	75	284	477		12	281	367	373	87
71	326	543	1033	111	198	321	678	1524	164	71	291	473		13	281	375	381	88
41	146	359	650	65	89	218	420	1548	155	115	211	519	-	5	266	284	289	89
46	171	411	723	73	104	243	468	1544	155	103	222	520	-	6	266	294	299	90
50	192	445	781	79	117	263	506	1542	155	95	230	519	-	6	266	302	307	91
55	220	485	853	86	133	287	554	1539	155	87	240	518	-	5	266	312	317	92
58	242	516	911	92	147	305	592	1537	155	81	248	515	-	4	266	320	325	93
63	272	554	983	99	165	328	640	1535	155	75	258	512	-	3	266	330	335	94
67	297	583	1041	105	180	345	678	1534	155	71	265	508	-	1	266	338	343	95
71	323	611	1098	111	196	362	716	1533	155	67	273	505		0	266	346	351	96
41	142	416	693	65	86	246	446	1556	146	108	193	552	-	17	251	254	259	97
46	167	454	770	73	101	274	496	1553	146	97	204	553	-	18	251	264	269	98
50	187	501	832	79	114	296	537	1550	146	90	212	552	-	17	251	272	277	99
55	215	546	909	86	130	323	587	1548	146	82	221	550	-	17	251	282	287	100

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A	S	–	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%		T	U	SW%	SV%	J
56	237	581	971	92	144	344	628	1546	146	77	229	548	-	16	251	290	295	101
63	267	624	1048	99	162	369	679	1544	146	71	239	544	-	14	251	300	305	102
67	292	657	1110	105	177	389	719	1543	146	67	246	540	-	13	251	308	313	103
71	318	689	1171	111	193	408	760	1542	146	63	254	537	-	12	251	316	321	104
41	136	526	796	55	82	311	507	1572	129	95	162	614	-	36	220	205	209	105
46	150	585	885	73	97	346	564	1569	129	85	172	614	-	36	220	215	219	106
50	181	631	956	79	110	374	610	1567	129	79	180	612	-	35	220	223	227	107
55	209	688	1045	86	126	407	668	1565	129	72	189	610	-	35	220	233	237	108
56	232	732	1116	92	141	433	714	1564	129	68	197	607	-	34	220	241	245	109
63	262	785	1205	99	159	465	771	1562	129	62	206	602	-	33	220	250	255	110
67	286	827	1276	105	175	489	817	1561	129	59	214	599	-	32	220	258	263	111
71	315	867	1347	111	191	513	863	1560	129	56	221	594	-	30	220	266	271	112
41	170	195	501	65	103	116	332	1506	196	145	311	348		91	336	466	472	113
46	198	218	556	73	120	129	370	1504	196	130	324	349		90	336	476	482	114
50	221	236	601	79	134	140	400	1501	196	120	334	349		91	336	484	490	115
55	250	257	656	86	152	152	438	1497	196	110	347	347		92	336	494	500	116
56	275	273	700	92	167	162	468	1495	196	103	356	345		94	336	502	508	117
63	306	292	755	99	186	173	506	1493	196	95	367	342		96	336	512	518	118
67	332	307	800	105	201	182	536	1491	196	90	375	339		99	336	520	526	119
71	358	321	844	111	217	190	566	1490	196	85	383	335		102	336	528	534	120
41	171	240	547	65	104	142	359	1522	182	134	288	396		56	311	416	422	121
46	199	268	607	73	120	159	400	1518	182	121	301	397		55	311	426	432	122
50	222	290	655	79	134	171	433	1515	182	111	311	396		55	311	434	440	123
55	252	316	716	86	153	187	473	1512	182	102	322	394		57	311	444	450	124
56	276	336	764	92	167	199	506	1510	182	95	331	392		58	311	452	458	125
63	308	359	824	99	187	213	547	1508	182	88	341	389		60	311	462	468	126
67	334	378	873	105	203	223	580	1506	182	83	350	386		63	311	470	476	127
71	351	395	921	111	219	234	612	1504	182	79	358	382		65	311	478	484	128
41	158	274	567	65	96	162	371	1528	176	130	258	436		32	301	366	372	129
46	184	306	630	73	112	181	413	1524	176	117	270	438		31	301	376	382	130
50	206	331	680	79	125	196	447	1521	176	108	279	437		31	301	384	390	131
55	234	360	743	86	142	213	489	1518	176	99	290	436		32	301	394	400	132
56	257	383	793	92	156	227	523	1516	176	92	298	434		33	301	402	408	133
63	288	411	856	99	174	243	565	1514	176	85	309	430		35	301	412	418	134
67	313	433	906	105	190	256	599	1513	176	80	317	427		37	301	420	426	135
71	339	453	956	111	205	268	633	1511	176	76	324	424		39	301	428	434	136
41	156	321	612	55	94	190	398	1539	164	121	237	478		11	281	326	332	137
46	192	358	680	73	110	212	443	1535	164	109	248	479		11	281	336	342	138
50	203	387	734	79	123	229	479	1533	164	101	257	478		11	281	344	350	139
55	231	422	802	86	140	250	524	1530	164	92	268	477		12	281	354	360	140
56	255	449	857	92	155	266	560	1528	164	86	276	474		13	281	362	368	141
63	295	482	924	99	173	285	606	1526	164	80	286	471		15	281	372	378	142
67	311	507	979	105	188	300	642	1525	164	75	293	468		16	281	380	386	143
71	337	532	1033	111	204	315	678	1523	164	71	301	464		18	281	388	394	144
41	153	362	650	65	93	214	420	1547	155	115	220	510	-	2	266	296	302	145
46	178	404	723	73	108	239	468	1544	155	103	231	511	-	2	266	306	312	146
50	200	437	780	79	121	258	506	1541	155	95	240	510	-	2	266	314	320	147
55	228	476	853	86	138	282	554	1539	155	87	250	508	-	1	266	324	330	148
58	252	506	910	92	153	300	592	1537	155	81	258	506		0	266	332	338	149
63	282	543	983	99	171	321	640	1535	155	75	267	502		1	266	342	348	150

ONE POCKET MIXES   AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
67	308	572	1040	105	187	338	678	1534	155	71	275	499	3	266	350	356	151
71	334	599	1098	111	203	355	716	1532	155	67	283	495	4	266	358	364	152
41	119	409	693	65	90	242	446	1556	146	108	202	543	-14	251	267	272	153
46	174	456	770	73	106	270	496	1552	146	97	213	544	-14	251	277	282	154
50	196	492	832	79	119	291	537	1550	146	90	221	543	-14	251	285	290	155
55	224	537	909	86	136	317	587	1548	146	82	231	540	-13	251	294	300	156
58	248	571	971	92	150	338	628	1546	146	77	239	538	-12	251	302	308	157
63	278	613	1048	99	169	362	679	1544	146	71	248	534	-11	251	312	318	158
67	304	645	1109	105	184	382	719	1543	146	67	256	531	-10	251	320	326	159
71	330	676	1171	111	200	400	760	1541	146	63	264	527	-8	251	328	334	160
41	114	517	796	65	87	306	507	1572	129	95	172	604	-33	220	217	222	161
46	169	576	885	73	103	341	564	1569	129	85	182	604	-33	220	227	232	162
50	191	621	956	79	116	368	610	1567	129	79	190	602	-33	220	235	240	163
55	220	677	1045	86	133	400	668	1565	129	72	199	600	-32	220	245	250	164
58	214	720	1116	92	148	426	714	1563	129	68	207	597	-31	220	253	258	165
63	275	772	1205	99	167	457	771	1562	129	62	216	592	-30	220	263	268	166
67	302	813	1275	105	183	481	817	1560	129	59	224	588	-29	220	271	276	167
71	329	853	1346	111	200	504	863	1559	129	56	231	584	-27	220	279	284	168
41	175	131	501	65	106	113	332	1508	196	145	319	340	98	336	478	484	169
46	203	213	556	73	123	126	370	1503	196	130	333	341	97	336	488	494	170
50	227	230	601	79	137	136	400	1500	196	120	343	340	98	336	496	502	171
55	257	251	656	36	156	148	439	1497	196	110	355	338	99	336	506	512	172
58	292	256	700	92	171	157	468	1495	196	103	354	336	101	336	514	520	173
63	313	285	755	99	190	168	506	1492	196	95	375	333	104	336	524	530	174
67	340	239	799	105	206	177	536	1491	196	90	384	330	107	336	532	538	175
71	357	312	843	111	222	185	566	1489	196	85	392	326	111	336	540	546	176
41	175	235	546	65	107	139	359	1521	182	134	297	337	61	311	428	434	177
46	205	262	607	73	124	155	400	1517	182	121	310	388	61	311	438	444	178
50	228	233	655	79	138	168	433	1514	182	111	320	387	61	311	446	452	179
55	259	308	716	86	157	183	473	1511	182	102	331	386	63	311	456	462	180
58	284	328	764	92	172	194	506	1509	182	95	340	383	64	311	464	470	181
63	316	351	824	99	192	208	547	1507	182	88	351	380	67	311	474	480	182
67	343	369	873	105	208	218	580	1506	182	83	359	376	69	311	482	488	183
71	371	336	921	111	225	228	612	1504	182	79	367	373	72	311	490	496	184
41	153	258	567	65	99	159	371	1528	176	130	257	428	37	301	378	384	185
46	190	300	630	73	115	177	413	1524	176	117	279	429	36	301	388	394	186
50	212	324	680	79	129	192	447	1521	176	108	288	428	36	301	396	402	187
55	241	353	743	86	146	209	489	1518	176	99	299	427	37	301	406	412	188
58	265	375	793	32	161	222	523	1516	176	92	308	425	38	301	414	420	189
63	295	402	856	99	180	238	565	1514	176	85	318	421	40	301	424	430	190
67	322	423	906	105	195	250	599	1512	176	80	326	418	42	301	432	438	191
71	348	443	956	111	211	262	633	1511	176	76	334	414	44	301	440	446	192
41	151	315	612	65	98	187	398	1539	164	121	246	469	16	281	339	344	193
46	188	352	680	73	114	208	443	1535	164	109	257	470	15	281	349	354	194
50	210	380	734	79	128	225	479	1532	164	101	266	469	15	281	356	362	195
55	239	414	802	86	145	245	524	1530	164	92	277	467	16	281	366	372	196
58	254	440	856	92	160	261	560	1528	164	86	285	465	17	281	374	380	197
63	295	472	924	99	179	279	606	1526	164	80	295	461	19	281	384	390	198
67	321	437	978	105	194	294	642	1524	164	75	303	458	21	281	392	398	199
71	347	521	1033	111	211	308	678	1523	164	71	311	454	23	281	400	406	200

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
41	159	356	650	65	96	211	420	1547	155	115	229	501	2	266	309	314	201
46	186	397	722	73	113	235	468	1543	155	103	240	501	1	266	319	324	202
50	208	428	780	79	126	254	506	1541	155	95	249	501	2	266	327	332	203
55	237	467	852	86	144	276	554	1538	155	87	259	499	3	266	337	342	204
58	251	497	910	92	158	294	592	1537	155	81	267	496	4	266	345	350	205
63	293	533	982	99	177	315	640	1535	155	75	277	492	5	266	354	360	206
67	319	551	1040	105	193	332	678	1533	155	71	285	489	7	266	362	368	207
71	346	588	1098	111	209	348	716	1532	155	67	292	485	8	266	370	376	208
41	156	402	693	65	94	238	446	1555	146	108	212	534	-11	251	279	284	209
46	182	448	770	73	110	265	496	1552	146	97	222	534	-11	251	289	294	210
50	204	434	832	79	124	286	537	1550	146	90	231	533	-11	251	297	302	211
55	233	527	909	86	141	312	587	1547	146	82	241	531	-10	251	307	312	212
58	258	561	970	92	156	332	628	1545	146	77	249	528	-9	251	315	320	213
63	289	601	1047	99	175	356	679	1544	146	71	258	524	-7	251	325	330	214
67	315	633	1109	105	191	374	719	1542	146	67	266	521	-6	251	333	338	215
71	343	663	1171	111	208	393	760	1541	146	63	273	517	-5	251	341	346	216
41	152	509	796	65	92	301	507	1572	129	95	182	594	-30	220	230	234	217
46	178	556	885	73	108	335	564	1569	129	85	132	594	-30	220	240	244	218
50	201	611	956	79	122	362	610	1567	129	79	200	593	-30	220	248	252	219
55	231	665	1045	86	140	394	668	1564	129	72	209	590	-29	220	257	262	220
58	256	708	1116	92	155	419	714	1563	129	68	217	587	-28	220	265	270	221
63	288	759	1204	99	175	449	771	1561	129	62	226	582	-27	220	275	280	222
67	315	799	1275	105	191	473	817	1560	129	59	234	578	-26	220	283	288	223
71	344	838	1346	111	208	496	863	1559	129	56	241	574	-24	220	291	296	224
41	179	136	501	65	109	110	332	1507	196	145	327	332	106	336	491	497	225
46	208	208	556	73	126	123	370	1503	196	130	341	332	105	336	501	507	226
50	232	224	600	79	141	133	400	1500	196	120	352	332	106	336	509	515	227
55	263	244	656	86	159	144	438	1497	196	110	364	330	107	336	519	525	228
58	288	259	700	92	175	153	468	1495	196	103	373	328	109	336	527	533	229
63	321	277	755	99	194	164	506	1492	196	95	384	324	113	336	537	543	230
67	346	291	799	105	211	172	536	1490	196	90	393	321	116	336	545	551	231
71	375	304	843	111	227	180	566	1489	196	85	401	317	120	336	553	559	232
41	181	230	546	65	110	136	359	1521	182	134	306	379	67	311	441	447	233
46	210	256	607	73	127	152	400	1517	162	121	319	379	67	311	451	457	234
50	234	277	655	79	142	164	433	1514	152	111	328	379	67	311	459	465	235
55	256	301	715	86	161	178	473	1511	182	102	340	377	69	311	469	475	236
58	291	320	764	92	177	189	506	1509	182	95	349	374	71	311	477	483	237
63	325	343	824	99	197	203	547	1507	182	88	360	371	73	311	487	493	238
67	352	360	872	105	213	213	580	1505	182	83	368	367	76	311	495	501	239
71	390	376	921	111	230	223	612	1504	182	79	376	364	79	311	503	509	240
41	159	263	567	65	102	156	371	1527	176	130	275	419	41	301	391	397	241
46	196	293	630	73	119	174	413	1523	176	117	288	420	41	301	401	407	242
50	219	317	680	79	133	188	447	1521	176	108	297	419	41	301	409	415	243
55	249	345	743	86	151	204	489	1518	176	99	308	418	42	301	419	425	244
58	273	367	793	92	166	217	523	1516	176	92	317	415	44	301	427	433	245
63	305	394	855	99	185	233	565	1514	176	85	327	412	46	301	437	443	246
67	331	414	906	105	201	245	599	1512	176	80	335	409	48	301	445	451	247
71	358	433	956	111	217	256	633	1511	176	76	343	405	50	301	453	459	248
41	167	309	612	65	101	183	398	1538	164	121	255	460	20	281	351	357	249
46	195	345	680	73	118	204	443	1535	164	109	257	461	19	281	361	367	250

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
50	218	372	734	79	132	220	479	1532	164	101	275	460	20	281	369	375	251
55	248	406	802	86	150	240	524	1529	164	92	286	458	21	281	379	385	252
58	272	432	856	92	165	255	560	1527	164	86	294	456	22	281	387	393	253
63	304	463	924	99	184	274	606	1525	164	80	304	452	24	281	397	403	254
67	331	487	978	105	201	288	642	1524	164	75	312	449	25	281	405	411	255
71	358	510	1032	111	217	302	678	1523	164	71	320	445	27	281	413	419	256
41	165	349	650	65	100	207	420	1546	155	115	238	492	5	266	321	327	257
46	193	389	722	73	117	230	468	1543	155	103	250	492	5	266	331	337	258
50	216	420	780	79	131	249	506	1541	155	95	258	491	6	266	339	345	259
55	246	458	852	86	149	271	554	1538	155	87	269	489	7	266	349	355	260
58	270	487	910	92	164	288	592	1536	155	81	277	487	8	266	357	363	261
63	303	522	982	99	183	309	640	1534	155	75	287	483	9	266	367	373	262
67	330	549	1040	105	200	325	678	1533	155	71	294	479	11	266	375	381	263
71	357	576	1097	111	216	341	716	1532	155	67	302	475	13	266	383	389	264
41	163	395	693	65	99	234	446	1555	146	108	221	524	- 7	251	292	297	265
46	190	440	770	73	115	260	496	1551	146	97	232	525	- 8	251	301	307	266
50	213	475	832	79	129	281	537	1549	146	90	240	524	- 7	251	309	315	267
55	243	517	909	86	147	306	587	1547	146	82	250	521	- 6	251	319	325	268
58	268	550	970	92	162	326	628	1545	146	77	258	519	- 5	251	327	333	269
63	300	590	1047	99	182	349	679	1543	146	71	268	515	- 4	251	337	343	270
67	327	621	1109	105	198	367	719	1542	146	67	276	511	- 2	251	345	351	271
71	355	651	1170	111	215	385	760	1541	146	63	283	507	- 1	251	353	359	272
41	160	501	796	65	97	296	507	1571	129	95	191	585	- 28	220	242	247	273
46	188	557	885	73	114	330	564	1568	129	85	202	584	- 27	220	252	257	274
50	211	601	956	79	128	356	610	1566	129	79	210	583	- 27	220	260	265	275
55	242	654	1044	86	146	387	668	1564	129	72	219	580	- 26	220	270	275	276
58	267	696	1115	92	162	412	714	1563	129	68	227	577	- 25	220	278	283	277
63	301	746	1204	99	182	441	771	1561	129	62	237	572	- 24	220	288	293	278
67	329	785	1275	105	200	464	817	1560	129	59	244	566	- 22	220	295	301	279
71	358	823	1346	111	217	487	863	1559	129	56	252	564	- 21	220	303	309	280
41	160	167	462	65	97	99	309	1495	211	156	314	319	118	361	491	497	281
46	187	186	513	73	113	110	344	1490	211	140	329	320	117	361	501	507	282
50	208	202	554	79	126	119	372	1487	211	129	339	320	117	361	509	515	283
55	237	220	605	86	143	130	408	1484	211	118	352	319	118	361	519	525	284
58	260	233	645	92	157	138	436	1482	211	111	361	317	120	361	527	533	285
63	289	250	696	99	175	148	471	1479	211	102	373	314	123	361	537	543	286
67	314	262	737	105	190	155	499	1477	211	97	381	311	126	361	545	551	287
71	339	274	777	111	205	162	527	1475	211	91	390	308	129	361	553	559	288
41	151	205	501	65	98	121	332	1509	196	145	294	365	78	336	441	447	289
46	198	229	557	73	114	135	370	1504	196	130	307	366	77	336	451	457	290
50	210	248	601	79	127	146	400	1501	196	120	317	366	77	336	459	465	291
55	238	270	656	86	144	160	438	1498	196	110	329	365	78	336	469	475	292
58	261	287	700	92	158	170	468	1496	196	103	338	363	79	336	477	483	293
63	291	307	756	99	177	182	506	1494	196	95	349	360	82	336	487	493	294
67	316	323	800	105	192	191	536	1492	196	90	357	357	84	336	495	501	295
71	342	338	844	111	207	200	566	1490	196	85	365	353	87	336	503	509	296
41	150	234	519	65	91	138	343	1515	190	141	265	404	51	326	391	397	297
46	175	261	576	73	106	155	381	1511	190	126	278	405	50	326	401	407	298
50	195	283	622	79	118	167	413	1508	190	117	287	406	50	326	409	415	299
55	222	309	679	86	135	183	452	1505	190	107	298	404	50	326	419	425	300

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ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
58	214	329	725	92	148	194	483	1503	190	100	307	403	51	326	427	433	301
63	273	352	783	99	166	209	522	1500	190	92	317	400	53	326	437	443	302
67	297	371	828	105	180	219	553	1499	190	87	325	397	55	326	445	451	303
71	321	388	874	111	195	230	584	1497	190	83	333	394	57	326	453	459	304
41	148	274	557	65	90	162	365	1526	179	132	246	444	28	306	351	357	305
46	173	306	619	73	105	181	407	1522	179	119	258	445	27	306	361	367	306
50	193	331	668	79	117	196	440	1519	179	110	267	445	27	306	369	375	307
55	220	361	730	86	133	214	481	1516	179	100	277	444	28	306	379	385	308
58	212	384	779	92	147	227	514	1514	179	94	286	442	29	306	387	393	309
63	271	412	841	99	164	244	556	1512	179	87	296	439	30	306	397	403	310
67	295	434	890	105	179	257	589	1510	179	82	304	436	32	306	405	411	311
71	320	455	939	111	194	269	622	1509	179	77	311	433	34	306	413	419	312
41	115	308	589	65	88	182	384	1534	170	126	230	475	13	291	321	327	313
46	170	344	654	73	103	204	428	1530	170	113	241	476	12	291	331	337	314
50	191	372	707	79	116	220	463	1528	170	104	250	476	12	291	339	345	315
55	218	406	772	86	132	240	506	1525	170	95	261	474	13	291	349	355	316
58	210	432	824	92	145	256	541	1523	170	89	269	472	14	291	357	363	317
63	259	464	889	99	163	274	585	1521	170	82	279	469	15	291	367	373	318
67	293	489	942	105	177	289	620	1519	170	78	286	466	17	291	375	381	319
71	317	512	994	111	192	303	655	1518	170	74	294	463	19	291	383	389	320
41	113	347	525	65	86	205	405	1542	161	119	213	506	-1	276	292	297	321
46	157	387	694	73	101	229	451	1539	161	107	224	508	-1	276	301	307	322
50	187	418	750	79	114	248	488	1536	161	99	233	507	-1	276	309	315	323
55	214	456	819	86	130	270	534	1534	161	90	243	506	0	276	319	325	324
58	236	436	874	92	143	287	571	1532	161	84	251	504	1	276	327	333	325
63	255	521	944	99	161	308	617	1530	161	78	261	500	2	276	337	343	326
67	289	549	999	105	175	325	654	1528	161	74	268	497	3	276	345	351	327
71	314	576	1054	111	190	341	690	1527	161	70	276	493	5	276	353	359	328
41	139	435	709	65	84	257	455	1559	143	106	185	566	-22	246	242	247	329
46	153	434	788	73	99	287	506	1556	143	95	195	566	-22	246	252	257	330
50	184	523	851	79	111	310	548	1553	143	88	203	565	-22	246	260	265	331
55	211	570	930	86	128	338	599	1551	143	80	213	563	-21	246	270	275	332
58	233	607	993	92	141	359	641	1549	143	75	221	561	-20	246	278	283	333
63	253	652	1072	99	159	386	692	1547	143	70	230	557	-19	246	288	293	334
67	299	636	1135	105	174	406	734	1546	143	66	238	553	-18	246	295	301	335
71	313	720	1198	111	190	426	775	1545	143	62	245	549	-16	246	303	309	336
41	154	152	462	65	100	96	309	1495	211	156	322	311	126	361	503	509	337
46	191	182	513	73	116	107	344	1490	211	140	337	312	125	361	513	519	338
50	214	196	554	79	129	116	372	1487	211	129	348	312	125	361	521	527	339
55	242	214	605	86	147	127	408	1484	211	118	360	311	127	361	531	537	340
58	266	227	645	92	161	134	436	1481	211	111	370	309	129	361	539	545	341
63	296	243	696	99	179	144	471	1479	211	102	381	306	132	361	549	555	342
67	321	255	737	105	194	151	499	1477	211	97	390	303	135	361	557	563	343
71	346	266	777	111	210	158	527	1475	211	91	398	299	139	361	565	571	344
41	156	200	501	65	100	118	332	1508	196	145	302	356	84	336	453	459	345
46	193	224	557	73	117	132	370	1504	196	130	316	358	83	336	463	469	346
50	215	242	601	79	130	143	400	1501	196	120	326	357	84	336	471	477	347
55	244	263	656	86	148	156	438	1498	196	110	338	356	85	336	481	487	348
58	268	280	700	92	162	166	468	1496	196	103	347	354	86	336	489	495	349
63	239	300	756	99	181	177	506	1493	196	95	358	351	89	336	499	505	350

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
67	324	315	800	105	196	186	536	1491	196	90	366	348	92	336	507	513	351
71	350	329	844	111	212	195	566	1490	196	85	374	344	94	336	515	521	352
41	155	229	519	65	94	135	343	1515	190	141	274	395	56	326	403	409	353
46	180	256	576	73	109	151	381	1510	190	126	286	397	55	326	413	419	354
50	201	277	622	79	122	164	413	1507	190	117	296	397	55	326	421	427	355
55	229	302	679	86	139	179	452	1504	190	107	307	396	56	326	431	437	356
58	252	321	725	92	152	190	483	1502	190	100	316	394	57	326	439	445	357
63	281	345	782	99	170	204	522	1500	190	92	326	391	59	326	449	455	358
67	305	362	828	105	185	214	553	1498	190	87	334	388	61	326	457	463	359
71	330	390	874	111	200	225	584	1497	190	83	342	385	63	326	465	471	360
41	153	268	557	65	93	159	365	1526	179	132	254	435	33	306	363	369	361
46	179	300	619	73	108	177	407	1522	179	119	266	436	32	306	373	379	362
50	200	324	668	79	121	192	440	1519	179	110	275	436	32	306	381	387	363
55	227	354	730	86	138	209	481	1516	179	100	286	435	33	306	391	397	364
58	250	376	779	92	152	223	514	1514	179	94	295	433	34	306	399	405	365
63	280	404	840	99	169	239	556	1512	179	87	305	430	35	306	409	415	366
67	304	425	890	105	184	251	589	1510	179	82	313	427	37	306	417	423	367
71	329	445	939	111	200	263	622	1509	179	77	321	423	39	306	425	431	368
41	151	302	589	65	92	179	384	1534	170	126	239	466	17	291	334	339	369
46	177	338	654	73	107	200	428	1530	170	113	250	467	16	291	344	349	370
50	198	365	707	79	120	216	463	1527	170	104	259	467	17	291	352	357	371
55	225	398	772	86	137	235	506	1525	170	95	270	465	17	291	361	367	372
58	248	424	824	92	150	251	541	1523	170	89	278	463	18	291	369	375	373
63	278	434	889	99	168	269	585	1521	170	82	288	460	20	291	379	385	374
67	302	478	941	105	183	283	620	1519	170	78	296	457	21	291	387	393	375
71	328	501	993	111	199	297	655	1518	170	74	303	453	23	291	395	401	376
41	149	341	625	65	90	201	405	1542	161	119	222	497	3	276	304	309	377
46	174	380	694	73	105	225	451	1538	161	107	234	499	3	276	314	319	378
50	195	411	749	79	118	243	488	1536	161	99	242	498	3	276	322	327	379
55	222	448	819	86	135	265	534	1533	161	90	252	496	4	275	332	337	380
58	245	477	874	92	149	282	571	1532	161	84	260	494	4	276	340	345	381
63	275	511	943	99	167	303	617	1529	161	78	270	491	6	276	350	355	382
67	300	538	999	105	182	319	654	1528	161	74	278	487	7	276	357	363	383
71	325	564	1054	111	197	334	690	1527	161	70	285	484	9	276	365	371	384
41	146	427	709	65	88	253	455	1558	143	106	194	556	-19	246	254	259	385
46	171	476	788	73	104	282	506	1555	143	95	205	557	-19	246	264	269	386
50	192	514	851	79	117	304	548	1553	143	88	213	556	-18	246	272	277	387
55	220	561	929	86	134	332	599	1551	143	80	223	553	-18	246	282	287	388
58	214	597	992	92	148	353	641	1549	143	75	231	551	-17	246	290	295	389
63	274	640	1071	99	166	379	692	1547	143	70	240	547	-15	246	300	305	390
67	300	674	1134	105	182	399	734	1546	143	66	248	543	-14	246	308	313	391
71	326	707	1197	111	198	418	775	1545	143	62	255	539	-13	246	316	321	392
41	168	158	462	65	102	94	309	1495	211	156	330	303	135	361	516	522	393
46	196	177	513	73	119	105	344	1490	211	140	345	304	134	361	526	532	394
50	219	191	554	79	133	113	372	1487	211	129	356	304	134	361	534	540	395
55	248	208	604	86	150	123	408	1483	211	118	369	302	136	361	544	550	396
58	272	221	645	92	165	131	436	1481	211	111	378	300	138	361	552	558	397
63	303	236	696	99	183	140	471	1478	211	102	390	297	142	361	562	568	398
67	328	248	736	105	199	147	499	1476	211	97	398	294	145	361	570	576	399
71	354	259	777	111	214	153	527	1475	211	91	407	291	149	361	578	584	400

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ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
41	170	195	501	65	103	116	332	1508	196	145	311	348	91	336	466	472	401
46	198	218	556	73	120	129	370	1504	196	130	324	349	90	336	476	482	402
50	221	236	601	79	134	140	400	1501	196	120	334	349	91	335	484	490	403
55	250	257	656	86	152	152	438	1497	196	110	347	347	92	336	494	500	404
58	275	273	700	92	167	162	468	1495	196	103	356	345	94	336	502	508	405
63	306	292	755	99	186	173	506	1493	196	95	367	342	96	336	512	518	406
67	332	307	800	105	201	182	536	1491	196	90	375	339	99	336	520	526	407
71	358	321	844	111	217	190	566	1490	196	85	383	335	102	336	528	534	408
41	159	224	519	65	97	133	343	1514	190	141	282	387	62	326	416	422	409
46	186	250	576	73	112	148	381	1510	190	126	295	388	61	326	426	432	410
50	207	271	622	79	126	160	413	1507	190	117	304	388	61	326	434	440	411
55	235	295	679	86	143	175	452	1504	190	107	316	387	62	326	444	450	412
58	259	314	725	92	157	186	483	1502	190	100	325	385	63	326	452	458	413
63	289	337	782	99	175	199	522	1500	190	92	335	382	65	326	462	468	414
67	313	354	828	105	190	209	553	1498	190	87	344	379	67	326	470	476	415
71	339	371	874	111	205	219	584	1496	190	83	352	375	70	326	478	484	416
41	158	263	557	65	96	156	365	1525	179	132	263	426	37	306	376	382	417
46	185	294	618	73	112	174	407	1521	179	119	275	428	37	306	386	392	418
50	206	318	668	79	125	188	440	1518	179	110	284	427	37	306	394	400	419
55	234	346	729	86	142	205	481	1516	179	100	295	426	38	306	404	410	420
58	258	368	779	92	156	218	514	1514	179	94	304	424	39	306	412	418	421
63	288	395	840	99	175	234	556	1511	179	87	314	421	41	306	422	428	422
67	313	416	889	105	190	246	589	1510	179	82	322	417	42	306	430	436	423
71	339	435	939	111	205	258	622	1508	179	77	330	414	44	306	438	444	424
41	157	297	589	65	95	175	384	1533	170	126	248	457	21	291	346	352	425
46	183	331	654	73	111	196	428	1530	170	113	259	458	21	291	356	362	426
50	205	358	706	79	124	212	463	1527	170	104	268	458	21	291	364	370	427
55	233	390	772	86	141	231	506	1524	170	95	279	456	22	291	374	380	428
58	256	415	824	92	155	246	541	1522	170	89	287	454	23	291	382	388	429
63	287	445	889	99	174	263	585	1520	170	82	297	450	24	291	392	398	430
67	312	468	941	105	189	277	620	1519	170	78	305	447	26	291	400	406	431
71	338	491	993	111	205	290	655	1517	170	74	313	444	28	291	408	414	432
41	155	334	624	65	94	198	405	1542	161	119	231	488	7	276	316	322	433
46	181	373	694	73	109	221	451	1538	161	107	243	489	6	276	326	332	434
50	202	403	749	79	123	238	488	1536	161	99	251	489	7	276	334	340	435
55	231	439	818	86	140	260	534	1533	161	90	262	487	7	276	344	350	436
58	254	468	874	92	154	277	571	1531	161	84	270	485	8	276	352	358	437
63	285	502	943	99	172	297	617	1529	161	78	280	481	10	276	362	368	438
67	310	528	996	105	188	312	654	1528	161	74	287	478	11	276	370	376	439
71	336	553	1054	111	204	327	690	1526	161	70	295	474	13	276	378	384	440
41	153	420	708	65	93	249	455	1558	143	106	204	547	-15	246	267	272	441
46	179	468	787	73	109	277	506	1555	143	95	214	547	-16	246	277	282	442
50	201	506	850	79	122	299	548	1553	143	88	223	546	-15	246	285	290	443
55	230	551	929	86	139	326	599	1550	143	80	232	544	-14	246	294	300	444
58	254	586	992	92	154	347	641	1549	143	75	240	541	-13	246	302	308	445
63	285	629	1071	99	173	372	692	1547	143	70	250	537	-12	246	312	318	446
67	312	662	1134	105	189	391	734	1545	143	66	257	533	-11	246	320	326	447
71	339	694	1197	111	205	410	775	1544	143	62	265	529	-9	246	328	334	448
41	172	134	462	65	105	91	309	1494	211	156	338	295	144	361	528	534	449
46	201	172	513	73	122	102	344	1490	211	140	353	296	143	361	538	544	450

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
50	224	136	553	79	136	110	372	1486	211	129	364	295	143	361	546	552	451
55	253	202	604	86	154	120	408	1483	211	118	377	294	145	361	556	562	452
58	278	215	645	92	168	127	436	1481	211	111	387	292	148	361	564	570	453
63	309	229	696	99	187	136	471	1478	211	102	398	288	152	361	574	580	454
67	335	240	736	105	203	142	499	1476	211	97	407	285	156	361	582	588	455
71	361	251	777	111	219	148	527	1474	211	91	416	282	160	361	590	596	456
41	175	191	501	65	106	113	332	1508	196	145	319	340	98	336	478	484	457
46	203	213	556	73	123	126	370	1503	196	130	333	341	97	336	488	494	458
50	227	230	601	79	137	136	400	1500	196	120	343	340	98	336	496	502	459
55	257	251	656	86	156	148	438	1497	196	110	355	338	99	336	506	512	460
58	232	256	700	92	171	157	468	1495	196	103	364	336	101	336	514	520	461
63	313	285	755	99	190	168	506	1492	196	95	375	333	104	336	524	530	462
67	310	299	799	105	206	177	536	1491	196	90	384	330	107	336	532	538	463
71	367	312	843	111	222	185	566	1489	196	85	392	326	111	336	540	546	464
41	164	219	519	65	99	130	343	1514	190	141	290	379	68	326	428	434	465
46	191	245	576	73	116	145	381	1510	190	126	303	380	67	326	438	444	466
50	213	255	622	79	129	157	413	1507	190	117	313	380	67	326	446	452	467
55	242	239	679	86	147	171	452	1504	190	107	325	378	68	326	456	462	468
58	256	307	725	92	161	182	483	1502	190	100	334	376	69	326	464	470	469
63	296	329	782	99	180	195	522	1499	190	92	344	373	72	326	474	480	470
67	322	346	828	105	195	204	553	1498	190	87	353	370	74	326	482	488	471
71	347	362	873	111	211	214	584	1496	190	83	361	366	76	326	490	496	472
41	164	258	557	65	99	152	365	1525	179	132	272	416	42	306	388	394	473
46	190	238	618	73	115	170	407	1521	179	119	284	419	42	306	398	404	474
50	213	311	668	79	129	184	440	1518	179	110	293	418	42	306	406	412	475
55	242	339	729	86	146	201	481	1515	179	100	304	417	43	306	416	422	476
58	256	351	778	92	161	213	514	1513	179	94	313	415	44	306	424	430	477
63	296	387	840	99	180	229	556	1511	179	87	323	411	46	306	434	440	478
67	322	406	389	105	195	240	589	1509	179	82	331	408	48	306	442	448	479
71	348	426	938	111	211	252	622	1508	179	77	339	405	50	306	450	456	480
41	153	291	589	65	99	172	384	1533	170	126	257	448	26	291	358	364	481
46	139	325	654	73	115	192	428	1529	170	113	258	449	25	291	368	374	482
50	212	351	706	79	128	208	463	1527	170	104	277	449	25	291	376	382	483
55	241	332	771	86	146	226	506	1524	170	95	288	447	26	291	386	392	484
58	255	407	824	92	160	241	541	1522	170	89	296	445	27	291	394	400	485
63	296	436	889	99	179	258	585	1520	170	82	307	441	29	291	404	410	486
67	322	459	941	105	195	271	620	1518	170	78	315	438	31	291	412	418	487
71	348	480	993	111	211	284	655	1517	170	74	322	434	33	291	420	426	488
41	151	328	624	65	97	194	405	1541	161	119	240	479	11	276	329	334	489
46	137	356	694	73	114	217	451	1538	161	107	252	480	10	276	339	344	490
50	210	395	749	79	127	234	488	1535	161	99	261	480	11	276	347	352	491
55	239	431	818	86	145	255	534	1533	161	90	271	478	12	276	356	362	492
58	263	458	874	92	159	271	571	1531	161	84	279	475	13	276	364	370	493
63	294	492	943	99	178	291	617	1529	161	78	289	472	14	276	374	380	494
67	320	517	998	105	194	306	654	1527	161	74	297	468	16	276	382	388	495
71	347	542	1053	111	210	321	690	1526	161	70	305	465	18	276	390	396	496
41	160	413	708	65	97	244	455	1558	143	106	213	537	- 12	246	279	284	497
46	187	460	787	73	113	272	506	1554	143	95	224	538	- 12	246	289	294	498
50	210	437	850	79	127	294	548	1552	143	88	232	536	- 12	246	297	302	499
55	240	541	929	86	145	320	599	1550	143	80	242	534	- 11	246	307	312	500

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
58	264	575	992	92	160	340	641	1548	143	75	250	531	-10	246	315	320	501
63	297	617	1071	99	180	365	692	1546	143	70	260	527	-9	246	325	330	502
67	324	649	1134	105	196	384	734	1545	143	66	267	524	-7	246	333	338	503
71	352	631	1197	111	213	403	775	1544	143	62	275	520	-6	246	341	346	504
41	176	150	462	65	107	89	309	1494	211	156	346	287	153	361	541	547	505
46	205	167	513	73	124	99	344	1489	211	140	361	288	152	361	551	557	506
50	229	181	553	79	139	107	372	1486	211	129	372	287	153	361	559	565	507
55	259	197	604	86	157	116	408	1483	211	118	385	285	156	361	569	575	508
58	284	208	645	92	172	123	436	1480	211	111	395	283	158	361	577	583	509
63	316	223	696	99	192	132	471	1478	211	102	407	280	163	361	587	593	510
67	342	233	736	105	207	138	499	1476	211	97	416	277	167	361	595	601	511
71	369	243	777	111	224	144	527	1474	211	91	424	273	172	361	603	609	512
41	179	136	501	65	109	110	332	1507	196	145	327	332	106	336	491	497	513
46	208	208	556	73	126	123	370	1503	196	130	341	332	105	336	501	507	514
50	232	224	600	79	141	133	400	1500	196	120	352	332	106	336	509	515	515
55	263	244	656	86	159	144	438	1497	196	110	364	330	107	336	519	525	516
58	288	259	700	92	175	153	468	1495	196	103	373	328	109	336	527	533	517
63	321	277	755	99	194	164	506	1492	196	95	384	324	113	336	537	543	518
67	348	291	799	105	211	172	536	1490	196	90	393	321	116	336	545	551	519
71	375	304	843	111	227	180	566	1489	196	85	401	317	120	336	553	559	520
41	169	214	518	65	102	127	343	1514	190	141	299	370	74	326	441	447	521
46	196	239	576	73	119	142	381	1509	190	126	312	371	73	326	451	457	522
50	219	259	622	79	133	153	413	1506	190	117	322	371	73	326	459	465	523
55	246	282	679	86	151	167	452	1503	190	107	334	369	74	326	469	475	524
58	273	300	725	92	165	177	483	1501	190	100	342	367	76	326	477	483	525
63	304	321	782	99	184	190	522	1499	190	92	353	364	78	326	487	493	526
67	330	337	828	105	200	199	553	1497	190	87	362	361	81	326	495	501	527
71	356	353	873	111	216	209	584	1496	190	83	370	357	84	326	503	509	528
41	169	252	557	65	102	149	365	1524	179	132	280	409	47	306	401	407	529
46	196	282	618	73	119	167	407	1520	179	119	293	410	47	306	411	417	530
50	219	304	667	79	133	180	440	1518	179	110	302	410	47	306	419	425	531
55	249	332	729	86	151	196	481	1515	179	100	313	408	48	306	429	435	532
58	273	353	778	92	166	209	514	1513	179	94	322	406	50	306	437	443	533
63	305	378	840	99	185	224	556	1511	179	87	332	402	52	306	447	453	534
67	331	397	889	105	201	235	589	1509	179	82	341	399	54	306	455	461	535
71	358	416	938	111	217	246	622	1508	179	77	349	395	56	306	463	469	536
41	168	235	589	65	102	169	384	1533	170	126	265	439	30	291	371	377	537
46	196	318	654	73	119	188	428	1529	170	113	277	440	30	291	381	387	538
50	219	344	706	79	132	203	463	1526	170	104	286	440	30	291	389	395	539
55	248	374	771	86	150	222	506	1524	170	95	297	438	31	291	399	405	540
58	273	398	823	92	165	236	541	1522	170	89	306	435	32	291	407	413	541
63	305	427	889	99	185	252	585	1519	170	82	316	432	34	291	417	423	542
67	331	449	941	105	201	265	620	1518	170	78	324	428	36	291	425	431	543
71	358	470	993	111	217	278	655	1517	170	74	332	425	38	291	433	439	544
41	167	322	624	65	101	191	405	1541	161	119	249	470	15	276	341	347	545
46	194	359	693	73	118	212	451	1537	161	107	261	471	15	276	351	357	546
50	217	388	749	79	132	229	488	1535	161	99	270	470	15	276	359	365	547
55	247	423	818	86	150	250	534	1532	161	90	280	468	16	276	369	375	548
58	272	449	873	92	165	266	571	1530	161	84	299	466	17	276	377	383	549
63	304	482	943	99	184	285	617	1528	161	78	299	462	19	276	387	393	550

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
67	330	507	996	105	200	300	654	1527	161	74	306	459	20	276	395	401	551
71	358	531	1053	111	217	314	690	1526	161	70	314	455	22	276	403	409	552
41	167	406	708	65	101	240	455	1557	143	106	223	528	-9	246	292	297	553
46	195	452	787	73	118	267	506	1554	143	95	233	528	-9	246	301	307	554
50	218	488	850	79	132	289	548	1552	143	88	242	527	-8	246	309	315	555
55	249	531	929	86	151	314	599	1549	143	80	252	524	-7	246	319	325	556
58	275	565	992	92	166	334	641	1548	143	75	260	522	-6	246	327	333	557
63	308	606	1070	99	187	358	692	1546	143	70	270	517	-5	246	337	343	558
67	336	637	1133	105	203	377	734	1545	143	66	277	514	-3	246	345	351	559
71	364	668	1196	111	221	395	775	1543	143	62	285	510	-2	246	353	359	560
41	151	181	477	65	97	107	318	1501	205	152	307	337	101	351	471	477	561
46	137	202	530	73	114	120	354	1496	205	136	321	338	100	351	481	487	562
50	209	219	572	79	127	130	383	1493	205	126	331	338	100	351	489	495	563
55	237	239	624	86	144	141	419	1490	205	115	343	337	101	351	499	505	564
58	260	254	666	92	158	150	448	1487	205	108	352	335	103	351	507	513	565
63	290	272	719	99	176	161	484	1485	205	100	363	332	105	351	517	523	566
67	315	235	761	105	191	169	513	1483	205	94	372	329	108	351	525	531	567
71	340	298	803	111	206	177	542	1481	205	89	380	326	111	351	533	539	568
41	161	222	519	65	98	131	343	1514	190	141	285	384	64	326	421	427	569
46	198	248	576	73	114	147	381	1510	190	126	298	385	63	326	431	437	570
50	210	268	622	79	127	159	413	1507	190	117	308	385	63	326	439	445	571
55	238	293	679	86	144	173	452	1504	190	107	319	383	64	326	449	455	572
58	251	311	725	92	158	184	483	1502	190	100	328	381	65	326	457	463	573
63	292	333	782	99	177	197	522	1499	190	92	339	378	68	326	467	473	574
67	317	351	328	105	192	207	553	1498	190	87	347	375	70	326	475	481	575
71	342	367	874	111	207	217	584	1496	190	83	355	372	72	326	483	489	576
41	149	253	537	65	90	150	353	1520	185	136	256	423	39	316	371	377	577
46	174	283	597	73	105	167	394	1516	185	122	268	425	38	316	381	387	578
50	135	306	644	79	118	181	426	1514	185	113	277	425	38	316	389	395	579
55	221	334	704	86	134	198	466	1511	185	103	288	424	39	316	399	405	580
58	244	355	751	92	148	210	498	1508	185	97	296	422	40	316	407	413	581
63	272	381	811	99	165	226	538	1506	185	90	307	419	41	316	417	423	582
67	296	401	858	105	179	237	570	1505	185	85	315	416	43	316	425	431	583
71	321	420	906	111	194	249	602	1503	185	80	323	413	45	316	433	439	584
41	151	292	578	65	92	173	377	1531	173	128	242	457	21	296	341	347	585
46	176	326	642	73	107	193	420	1527	173	115	254	459	21	296	351	357	586
50	197	352	693	79	120	208	455	1525	173	106	263	458	21	296	359	365	587
55	225	384	757	86	136	227	498	1522	173	97	274	457	21	296	369	375	588
58	247	409	808	92	150	242	532	1520	173	91	282	455	22	296	377	383	589
63	277	439	872	99	168	260	575	1518	173	84	292	452	24	296	387	393	590
67	301	462	924	105	183	273	609	1516	173	79	300	448	25	296	395	401	591
71	326	484	975	111	198	286	643	1515	173	75	307	445	27	296	403	409	592
41	144	333	612	65	87	197	398	1540	164	121	219	496	4	281	301	307	593
46	168	372	680	73	102	220	443	1536	164	109	230	497	3	281	311	317	594
50	189	402	735	79	114	238	479	1533	164	101	239	497	3	281	319	325	595
55	215	439	803	86	131	260	524	1531	164	92	249	495	4	281	329	335	596
58	238	467	857	92	144	276	560	1529	164	86	257	493	5	281	337	343	597
63	266	501	925	99	162	297	606	1527	164	80	267	490	6	281	347	353	598
67	291	528	979	105	176	312	642	1525	164	75	274	487	8	281	355	361	599
71	315	554	1033	111	191	328	678	1524	164	71	282	483	9	281	363	369	600

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

1045

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
41	140	375	651	65	85	222	420	1548	155	115	202	528	- 9	266	272	277	601
46	164	419	723	73	99	248	468	1544	155	103	213	529	- 9	266	282	287	602
50	184	457	781	79	112	268	506	1542	155	95	221	529	- 9	266	290	295	603
55	211	494	853	86	128	292	554	1540	155	87	231	527	- 8	266	299	305	604
58	233	525	911	92	141	311	592	1538	155	81	239	525	- 8	266	307	313	605
63	252	564	983	99	159	334	640	1536	155	75	248	521	- 6	266	317	323	606
67	286	594	1041	105	173	351	678	1534	155	71	256	518	- 5	266	325	331	607
71	311	623	1098	111	189	369	716	1533	155	67	263	514	- 4	266	333	339	608
41	135	472	742	65	82	279	474	1564	138	102	172	588	- 29	236	222	227	609
46	159	525	824	73	96	311	528	1561	138	91	192	589	- 29	236	232	237	610
50	179	537	890	79	109	336	571	1559	138	84	190	588	- 28	236	240	245	611
55	205	618	973	86	125	366	625	1557	138	77	200	585	- 28	236	250	255	612
58	229	658	1039	92	139	389	668	1555	138	72	207	583	- 27	236	258	263	613
63	258	706	1122	99	157	418	722	1553	138	67	217	579	- 26	236	268	273	614
67	283	744	1188	105	172	440	765	1552	138	63	224	575	- 25	236	276	281	615
71	309	730	1254	111	187	462	808	1551	138	60	232	571	- 23	236	284	289	616
41	155	177	477	65	100	105	319	1500	205	152	315	329	108	351	483	489	617
46	192	138	530	73	116	117	354	1496	205	136	329	330	107	351	493	499	618
50	214	214	572	79	130	126	383	1493	205	126	339	330	107	351	501	507	619
55	243	233	624	86	147	138	419	1489	205	115	352	328	109	351	511	517	620
58	257	247	666	92	152	146	448	1487	205	108	361	326	111	351	519	525	621
63	297	265	719	99	180	157	484	1484	205	100	372	323	114	351	529	535	622
67	322	278	761	105	195	164	513	1483	205	94	381	320	117	351	537	543	623
71	318	290	803	111	211	172	542	1481	205	89	399	317	120	351	545	551	624
41	156	217	519	65	101	129	343	1514	190	141	294	375	70	326	433	439	625
46	193	243	576	73	117	144	381	1510	190	126	307	376	69	326	443	449	626
50	216	262	622	79	131	155	413	1507	190	117	317	376	69	326	451	457	627
55	215	286	679	86	148	169	452	1504	190	107	328	375	70	325	461	467	628
58	258	304	725	92	163	180	483	1501	190	100	337	373	72	326	469	475	629
63	299	326	782	99	181	193	522	1499	190	92	348	369	74	326	479	485	630
67	325	342	828	105	197	202	553	1497	190	87	356	366	77	326	487	493	631
71	351	358	873	111	213	212	584	1496	190	83	364	363	79	326	495	501	632
41	154	248	537	65	93	147	353	1520	185	136	264	415	44	316	383	389	633
46	180	277	597	73	109	164	394	1516	185	122	277	416	43	316	393	399	634
50	201	300	644	79	122	177	426	1513	185	113	296	416	43	316	401	407	635
55	228	327	704	86	138	193	466	1510	185	103	297	415	44	316	411	417	636
58	251	349	751	92	152	206	498	1508	185	97	305	413	45	316	419	425	637
63	280	373	810	99	170	221	538	1506	185	90	316	410	47	316	429	435	638
67	305	392	858	105	185	232	570	1504	185	85	324	407	49	316	437	443	639
71	330	411	905	111	200	243	602	1503	185	80	332	404	51	316	445	451	640
41	156	286	578	65	95	169	377	1531	173	128	251	448	26	296	354	359	641
46	192	319	642	73	111	189	420	1527	173	115	263	450	25	296	363	369	642
50	204	345	693	79	124	204	455	1524	173	106	272	449	25	296	371	377	643
55	232	376	757	86	141	223	498	1521	173	97	283	448	26	296	381	387	644
58	255	401	808	92	155	237	532	1519	173	91	291	446	27	296	389	395	645
63	296	430	872	99	173	254	575	1517	173	84	301	442	29	295	399	405	646
67	311	452	923	105	188	267	609	1516	173	79	309	439	30	295	407	413	647
71	336	474	974	111	204	280	643	1514	173	75	317	436	32	296	415	421	648
41	150	327	612	65	91	194	398	1539	164	121	228	487	8	281	314	319	649
46	175	365	680	73	106	216	443	1536	164	109	239	488	7	281	324	329	650

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
50	196	395	735	79	119	234	479	1533	164	101	248	488	7	281	332	337	651
55	223	431	802	86	135	255	524	1530	164	92	258	486	8	281	342	347	652
58	246	458	857	92	149	271	560	1529	164	86	266	484	9	281	350	355	653
63	276	492	925	99	167	291	606	1527	164	80	276	480	10	281	359	365	654
67	301	518	979	105	182	306	642	1525	164	75	284	477	12	281	367	373	655
71	326	543	1033	111	198	321	678	1524	164	71	291	473	13	281	375	381	656
41	145	369	650	65	89	218	420	1548	155	115	211	519	-5	266	284	289	657
46	171	411	723	73	104	243	468	1544	155	103	222	520	-6	266	294	299	658
50	192	445	781	79	117	263	506	1542	155	95	230	519	-6	266	302	307	659
55	220	485	853	86	133	287	554	1539	155	87	240	518	-5	266	312	317	660
56	242	516	911	92	147	305	592	1537	155	81	248	515	-4	266	320	325	661
63	272	554	983	99	165	328	640	1535	155	75	258	512	-3	266	330	335	662
67	297	583	1041	105	180	345	678	1534	155	71	265	508	-1	266	338	343	663
71	323	611	1098	111	196	362	716	1533	155	67	273	505	0	266	346	351	664
41	112	464	742	65	86	274	474	1564	138	102	182	579	-26	236	235	239	665
46	167	517	824	73	101	306	528	1561	138	91	192	579	-26	236	245	249	666
50	198	558	890	79	114	330	571	1559	138	84	200	578	-26	236	252	257	667
55	216	608	973	86	131	360	625	1556	138	77	210	576	-25	236	262	267	668
58	240	647	1039	92	145	383	668	1555	138	72	217	573	-24	236	270	275	669
63	270	694	1121	99	164	411	722	1553	138	67	227	569	-23	236	280	285	670
67	296	731	1187	105	179	432	765	1552	138	63	234	565	-21	236	288	293	671
71	322	766	1253	111	195	454	808	1551	138	60	242	561	-20	236	296	301	672
41	159	172	477	65	103	102	318	1500	205	152	323	321	116	351	496	502	673
46	197	193	530	73	119	114	354	1495	205	136	337	322	115	351	506	512	674
50	220	208	572	79	133	123	383	1492	205	126	348	321	115	351	514	520	675
55	219	227	624	86	151	134	419	1489	205	115	360	320	117	351	524	530	676
58	273	241	666	92	166	142	448	1487	205	108	369	318	119	351	532	538	677
63	304	257	719	99	184	152	484	1484	205	100	381	315	122	351	542	548	678
67	330	270	761	105	200	160	513	1482	205	94	389	312	125	351	550	556	679
71	356	282	803	111	216	167	542	1481	205	89	398	308	129	351	558	564	680
41	171	212	518	65	103	126	343	1513	190	141	302	367	76	326	446	452	681
46	198	237	576	73	120	140	381	1509	190	126	315	368	75	326	456	462	682
50	221	256	622	79	134	152	413	1506	190	117	325	367	76	326	464	470	683
55	251	279	679	86	152	165	452	1503	190	107	337	366	77	326	474	480	684
58	276	297	725	92	167	176	483	1501	190	100	346	364	79	326	482	488	685
63	307	318	782	99	186	188	522	1499	190	92	357	360	81	326	492	498	686
67	333	334	827	105	202	197	553	1497	190	87	365	357	84	326	500	506	687
71	360	349	873	111	218	207	584	1495	190	83	373	354	86	326	508	514	688
41	159	243	537	65	96	144	353	1520	185	136	273	406	49	316	396	402	689
46	185	271	597	73	112	161	394	1516	185	122	285	408	48	316	406	412	690
50	207	293	644	79	125	174	426	1513	185	113	295	408	48	316	414	420	691
55	235	320	703	86	142	189	466	1510	185	103	306	406	49	316	424	430	692
58	258	340	751	92	157	201	498	1508	185	97	314	404	50	316	432	438	693
63	288	365	810	99	175	216	538	1505	185	90	325	401	52	316	442	448	694
67	313	384	858	105	190	227	570	1504	185	85	333	398	54	316	450	456	695
71	339	402	905	111	205	238	602	1502	185	80	341	395	57	316	458	464	696
41	152	280	578	65	98	166	377	1530	173	128	260	440	30	296	366	372	697
46	189	313	642	73	114	185	420	1527	173	115	272	441	30	296	376	382	698
50	211	338	693	79	128	200	455	1524	173	106	281	440	30	296	384	390	699
55	240	369	757	86	145	218	498	1521	173	97	292	439	31	296	394	400	700

ONE POCKET MIXES   AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
58	263	392	808	92	160	232	532	1519	173	91	300	436	32	296	402	408	701
63	294	421	872	99	178	249	575	1517	173	84	310	433	34	296	412	418	702
67	320	442	923	105	194	262	609	1515	173	79	318	430	35	296	420	426	703
71	346	463	974	111	210	274	643	1514	173	75	326	426	37	296	428	434	704
41	156	321	612	65	94	190	398	1539	164	121	237	478	11	281	326	332	705
46	182	358	680	73	110	212	443	1535	164	109	248	479	11	281	336	342	706
50	203	387	734	79	123	229	479	1533	164	101	257	478	11	281	344	350	707
55	231	422	802	86	140	250	524	1530	164	92	268	477	12	281	354	360	708
58	255	449	857	92	155	266	560	1528	164	86	276	474	13	281	362	368	709
63	285	482	924	99	173	285	606	1526	164	80	286	471	15	281	372	378	710
67	311	507	979	105	188	300	642	1525	164	75	293	468	16	281	380	386	711
71	337	532	1033	111	204	315	678	1523	164	71	301	464	18	281	388	394	712
41	153	362	650	65	93	214	420	1547	155	115	220	510	-2	266	296	302	713
46	178	404	723	73	108	239	468	1544	155	103	231	511	-2	266	306	312	714
50	200	437	780	79	121	258	506	1541	155	95	240	510	-2	266	314	320	715
55	228	476	853	86	138	282	554	1539	155	87	250	508	-1	266	324	330	716
58	252	506	910	92	153	300	592	1537	155	81	258	506	0	266	332	338	717
63	282	543	983	99	171	321	640	1535	155	75	267	502	1	266	342	348	718
67	308	572	1040	105	187	338	678	1534	155	71	275	499	3	266	350	356	719
71	334	599	1098	111	203	355	716	1532	155	67	283	495	4	266	358	364	720
41	150	456	741	65	91	270	474	1564	138	102	191	569	-23	236	247	252	721
46	176	508	824	73	106	301	528	1560	138	91	202	569	-23	236	257	262	722
50	198	549	890	79	120	325	571	1558	138	84	210	568	-22	236	265	270	723
55	226	598	973	86	137	354	625	1556	138	77	220	566	-22	236	275	280	724
58	250	636	1039	92	152	376	668	1554	138	72	227	563	-21	236	283	288	725
63	282	682	1121	99	171	404	722	1553	138	67	237	559	-19	236	293	298	726
67	308	718	1187	105	187	425	765	1551	138	63	244	555	-18	236	300	306	727
71	336	753	1253	111	203	445	808	1550	138	60	252	551	-17	236	308	314	728
41	173	168	477	65	105	99	318	1500	205	152	331	313	124	351	508	514	729
46	202	138	529	73	122	111	354	1495	205	136	345	314	123	351	518	524	730
50	225	203	571	79	136	120	383	1492	205	126	356	313	124	351	526	532	731
55	255	221	624	86	154	131	419	1489	205	115	369	311	126	351	536	542	732
58	279	234	666	92	169	139	448	1486	205	108	378	309	128	351	544	550	733
63	311	250	718	99	189	148	484	1484	205	100	389	306	131	351	554	560	734
67	337	263	760	105	204	155	513	1482	205	94	398	303	135	351	562	568	735
71	364	274	802	111	220	162	542	1480	205	89	407	299	139	351	570	576	736
41	175	208	518	65	106	123	343	1513	190	141	310	359	83	326	458	464	737
46	204	232	576	73	124	137	381	1509	190	126	324	359	82	326	468	474	738
50	227	250	621	79	138	148	413	1506	190	117	334	359	82	326	476	482	739
55	258	272	679	86	156	161	452	1503	190	107	346	357	84	326	486	492	740
58	283	289	724	92	171	171	483	1501	190	100	355	355	86	326	494	500	741
63	315	310	782	99	191	183	522	1498	190	92	366	351	88	326	504	510	742
67	341	325	827	105	207	192	553	1497	190	87	374	348	91	326	512	518	743
71	368	340	873	111	223	201	584	1495	190	83	382	345	94	326	520	526	744
41	164	238	537	65	99	141	353	1519	185	136	281	398	54	316	408	414	745
46	191	266	596	73	116	157	394	1515	185	122	294	399	54	316	418	424	746
50	213	287	644	79	129	170	426	1512	185	113	303	399	54	316	426	432	747
55	242	313	703	86	147	185	466	1509	185	103	315	397	55	316	436	442	748
58	266	333	751	92	161	197	498	1507	185	97	323	395	56	316	444	450	749
63	297	357	810	99	180	211	538	1505	185	90	334	392	58	316	454	460	750

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
67	322	375	857	105	195	222	570	1503	185	85	342	389	60	316	462	468	751
71	348	392	905	111	211	232	602	1502	185	80	350	385	63	316	470	476	752
41	167	275	578	65	101	163	377	1530	173	128	269	431	35	296	378	384	753
46	195	307	642	73	118	182	420	1526	173	115	281	432	34	296	388	394	754
50	218	331	693	79	132	196	455	1524	173	106	290	431	35	296	396	402	755
55	247	361	757	86	150	214	498	1521	173	97	301	429	36	296	406	412	756
58	272	384	808	92	165	227	532	1519	173	91	309	427	37	296	414	420	757
63	303	412	872	99	184	244	575	1517	173	84	320	424	39	296	424	430	758
67	329	433	923	105	200	256	609	1515	173	79	328	420	41	296	432	438	759
71	356	453	974	111	216	268	643	1514	173	75	336	417	43	296	440	446	760
41	161	315	612	65	98	187	398	1539	164	121	246	469	16	281	339	344	761
46	188	352	680	73	114	208	443	1535	164	109	257	470	15	281	349	354	762
50	210	330	734	79	128	225	479	1532	164	101	266	469	15	281	356	362	763
55	239	414	802	86	145	245	524	1530	164	92	277	467	16	281	366	372	764
58	254	440	856	92	160	261	560	1528	164	86	285	465	17	281	374	380	765
63	295	472	924	99	179	279	606	1526	164	80	295	461	19	281	384	390	766
67	321	497	978	105	194	294	642	1524	164	75	303	458	21	281	392	398	767
71	347	521	1033	111	211	308	678	1523	164	71	311	454	23	281	400	406	768
41	159	356	650	65	96	211	420	1547	155	115	229	501	2	266	309	314	769
46	136	397	722	73	113	235	468	1543	155	103	240	501	1	266	319	324	770
50	208	428	780	79	126	254	506	1541	155	95	249	501	2	266	327	332	771
55	237	467	852	86	144	276	554	1538	155	87	259	499	3	266	337	342	772
58	261	497	910	92	158	294	592	1537	155	81	267	496	4	265	345	350	773
63	293	533	982	99	177	315	640	1535	155	75	277	492	5	266	354	360	774
67	319	561	1040	105	193	332	678	1533	155	71	285	489	7	266	362	368	775
71	346	538	1098	111	209	348	716	1532	155	67	292	485	8	266	370	376	776
41	157	449	741	65	95	265	474	1563	138	102	201	560	-20	236	259	264	777
46	184	500	824	73	112	296	528	1560	138	91	211	560	-20	236	269	274	778
50	207	539	890	79	125	319	571	1558	138	84	219	559	-19	236	277	282	779
55	236	587	972	86	143	347	625	1556	138	77	229	556	-19	236	287	292	780
58	261	625	1038	92	156	370	668	1554	138	72	237	553	-18	236	295	300	781
63	294	570	1121	99	178	396	722	1552	138	67	247	549	-16	236	305	310	782
67	321	705	1187	105	195	417	765	1551	138	63	254	545	-15	236	313	318	783
71	349	739	1253	111	212	437	808	1550	138	60	262	541	-13	236	321	326	784
41	178	154	477	65	108	97	318	1499	205	152	339	305	133	351	521	527	785
46	207	133	529	73	125	108	354	1495	205	136	353	305	132	351	531	537	786
50	230	197	571	79	140	117	383	1492	205	126	364	305	133	351	539	545	787
55	261	215	624	86	158	127	419	1488	205	115	377	303	135	351	549	555	788
58	296	228	666	92	173	135	448	1486	205	108	387	301	137	351	557	563	789
63	318	243	718	99	193	144	484	1483	205	100	398	297	141	351	567	573	790
67	345	255	760	105	209	151	513	1482	205	94	407	294	145	351	575	581	791
71	372	266	802	111	225	157	542	1480	205	89	415	290	149	351	583	589	792
41	180	203	518	65	109	120	343	1513	190	141	319	350	89	326	471	477	793
46	209	226	575	73	127	134	381	1509	190	126	332	351	89	326	481	487	794
50	233	244	621	79	141	144	413	1506	190	117	343	350	89	326	489	495	795
55	264	266	678	86	160	157	452	1503	190	107	355	348	91	326	499	505	796
58	290	232	724	92	176	167	483	1500	190	100	364	346	93	326	507	513	797
63	323	302	781	99	195	179	522	1498	190	92	375	342	96	326	517	523	798
67	350	317	827	105	212	187	553	1496	190	87	383	339	99	326	525	531	799
71	377	331	873	111	229	196	584	1495	190	83	392	336	102	326	533	539	800

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
41	159	233	537	65	102	138	353	1519	185	136	290	389	60	316	421	427	801
46	196	260	596	73	119	154	394	1515	185	122	303	390	59	316	431	437	802
50	219	281	644	79	133	166	426	1512	185	113	312	390	60	316	439	445	803
55	249	306	703	86	151	181	466	1509	185	103	324	388	61	316	449	455	804
58	273	325	751	92	166	192	498	1507	185	97	332	386	62	316	457	463	805
63	305	348	810	99	185	206	538	1505	185	90	343	383	64	316	467	473	806
67	331	366	857	105	200	217	570	1503	185	85	351	380	67	316	475	481	807
71	357	383	905	111	216	227	602	1502	185	80	359	376	69	316	483	489	808
41	173	259	577	65	105	159	377	1530	173	128	277	422	40	296	391	397	809
46	201	300	641	73	122	178	420	1526	173	115	290	423	39	296	401	407	810
50	224	324	693	79	136	192	455	1523	173	106	299	422	40	296	409	415	811
55	255	353	757	86	154	209	498	1520	173	97	310	420	41	296	419	425	812
58	280	376	808	92	169	222	532	1518	173	91	319	418	42	296	427	433	813
63	312	403	872	99	189	238	575	1516	173	84	329	414	44	296	437	443	814
67	339	423	923	105	205	250	609	1515	173	79	337	411	46	296	445	451	815
71	366	443	974	111	222	262	643	1513	173	75	345	407	48	296	453	459	816
41	167	309	612	65	101	183	398	1538	164	121	255	460	20	281	351	357	817
46	195	345	680	73	118	204	443	1535	164	109	267	461	19	281	361	367	818
50	218	372	734	79	132	220	479	1532	164	101	275	460	20	281	369	375	819
55	248	406	802	86	150	240	524	1529	164	92	286	458	21	281	379	385	820
58	272	432	856	92	155	255	560	1527	164	86	294	456	22	281	387	393	821
63	304	463	924	99	184	274	606	1525	164	80	304	452	24	281	397	403	822
67	331	457	978	105	201	288	642	1524	164	75	312	449	25	281	405	411	823
71	358	510	1032	111	217	302	678	1523	164	71	320	445	27	281	413	419	824
41	155	349	650	65	100	207	420	1546	155	115	238	492	5	266	321	327	825
46	193	389	722	73	117	230	468	1543	155	103	250	492	5	266	331	337	826
50	216	420	780	79	131	249	506	1541	155	95	258	491	6	266	339	345	827
55	246	458	852	86	149	271	554	1538	155	87	269	489	7	266	349	355	828
58	270	487	910	92	164	288	592	1536	155	81	277	487	8	266	357	363	829
63	303	522	982	99	183	309	640	1534	155	75	287	483	9	266	367	373	830
67	330	549	1040	105	200	325	678	1533	155	71	294	479	11	266	375	381	831
71	357	576	1097	111	216	341	716	1532	155	67	302	475	13	266	383	389	832
41	165	441	741	65	100	261	474	1563	138	102	210	550	-17	236	272	277	833
46	192	491	824	73	117	291	528	1560	138	91	221	550	-17	236	282	287	834
50	216	530	890	79	131	313	571	1558	138	84	229	549	-16	236	290	295	835
55	247	577	972	86	149	341	625	1555	138	77	239	546	-15	236	299	305	836
58	272	613	1038	92	155	363	668	1554	138	72	247	543	-14	236	307	313	837
63	306	658	1120	99	185	389	722	1552	138	67	257	539	-13	236	317	323	838
67	334	692	1186	105	202	409	765	1551	138	63	264	535	-11	236	325	331	839
71	362	725	1252	111	220	429	808	1549	138	60	272	531	-10	236	333	339	840
41	159	147	441	65	97	87	297	1487	220	162	325	292	147	376	521	527	841
46	186	154	490	73	112	97	330	1482	220	146	340	294	145	376	531	537	842
50	207	178	529	79	126	105	357	1479	220	135	351	294	145	376	539	545	843
55	235	193	577	86	142	114	391	1475	220	123	364	293	147	376	549	555	844
58	258	206	616	92	156	122	418	1473	220	115	374	291	149	376	557	563	845
63	287	220	664	99	174	130	452	1470	220	107	386	288	152	376	567	573	846
67	312	231	703	105	189	136	479	1468	220	101	394	285	156	376	575	581	847
71	336	241	742	111	204	143	506	1467	220	95	403	282	160	376	583	589	848
41	161	131	477	65	97	107	318	1501	205	152	307	337	101	351	471	477	849
46	197	202	530	73	114	120	354	1496	205	136	321	338	100	351	481	487	850

ONE POCKET MIXES   AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
50	209	219	572	79	127	130	383	1493	205	126	331	338	100	351	489	495	851
55	237	239	624	86	144	141	419	1490	205	115	343	337	101	351	499	505	852
58	260	254	666	92	158	150	448	1487	205	108	352	335	103	351	507	513	853
63	290	272	719	99	176	161	484	1485	205	100	363	332	105	351	517	523	854
67	315	285	761	105	191	169	513	1483	205	94	372	329	108	351	525	531	855
71	340	298	803	111	206	177	542	1481	205	89	380	326	111	351	533	539	856
41	151	207	493	65	91	123	327	1507	199	147	279	375	70	341	421	427	857
46	176	232	548	73	106	137	365	1502	199	132	292	377	69	341	431	437	858
50	196	251	591	79	119	149	394	1499	199	122	302	377	69	341	439	445	859
55	223	274	646	86	135	162	432	1496	199	112	313	376	69	341	449	455	860
58	245	292	689	92	149	173	461	1494	199	104	322	374	71	341	457	463	861
63	274	313	744	99	166	185	499	1491	199	97	333	371	73	341	467	473	862
67	297	329	787	105	180	195	528	1490	199	91	341	369	75	341	475	481	863
71	321	345	830	111	195	204	558	1488	199	86	349	365	77	341	483	489	864
41	150	243	528	65	91	144	348	1518	187	139	261	413	45	321	381	387	865
46	174	272	586	73	106	161	387	1513	187	124	273	415	44	321	391	397	866
50	195	294	633	79	118	174	419	1511	187	115	282	415	44	321	399	405	867
55	222	321	691	86	134	190	459	1508	187	105	293	414	44	321	409	415	868
58	244	342	738	92	148	202	490	1506	187	98	302	412	45	321	417	423	869
63	273	367	796	99	165	217	530	1503	187	91	312	409	47	321	427	433	870
67	297	386	843	105	180	228	561	1502	187	86	320	407	49	321	435	441	871
71	321	404	890	111	195	239	593	1500	187	81	328	403	51	321	443	449	872
41	148	274	557	65	90	162	365	1526	179	132	246	444	28	306	351	357	873
46	173	306	619	73	105	181	407	1522	179	119	258	445	27	306	361	367	874
50	193	331	668	79	117	196	440	1519	179	110	267	445	27	306	369	375	875
55	220	361	730	86	133	214	481	1516	179	100	277	444	28	306	379	385	876
58	242	384	779	92	147	227	514	1514	179	94	286	442	29	306	387	393	877
63	271	412	841	99	164	244	556	1512	179	87	296	439	30	306	397	403	878
67	295	434	890	105	179	257	589	1510	179	82	304	436	32	306	405	411	879
71	320	455	939	111	194	269	622	1509	179	77	311	433	34	306	413	419	880
41	146	308	589	65	88	182	384	1534	170	126	230	475	13	291	321	327	881
46	170	344	654	73	103	204	428	1530	170	113	241	476	12	291	331	337	882
50	191	372	707	79	116	220	463	1528	170	104	250	476	12	291	339	345	883
55	218	406	772	86	132	240	506	1525	170	95	261	474	13	291	349	355	884
58	240	432	824	92	145	256	541	1523	170	89	269	472	14	291	357	363	885
63	269	464	889	99	163	274	585	1521	170	82	279	469	15	291	367	373	886
67	293	488	942	105	177	289	620	1519	170	78	286	466	17	291	375	381	887
71	317	512	994	111	192	303	655	1518	170	74	294	463	19	291	383	389	888
41	144	385	664	65	87	228	428	1550	152	113	203	532	-10	261	272	277	889
46	168	430	738	73	102	254	477	1547	152	101	214	533	-11	261	282	287	890
50	189	464	797	79	115	275	516	1545	152	93	222	532	-10	261	290	295	891
55	216	506	871	86	131	299	565	1542	152	85	232	530	-10	261	299	305	892
58	239	539	930	92	145	319	604	1540	152	80	240	528	-9	261	307	313	893
63	269	578	1004	99	163	342	652	1538	152	74	250	524	-7	261	317	323	894
67	293	609	1063	105	178	360	691	1537	152	70	257	521	-6	261	325	331	895
71	319	638	1122	111	193	378	730	1536	152	66	265	517	-5	261	333	339	896
41	163	143	441	65	99	85	297	1487	220	162	333	285	156	376	533	539	897
46	190	160	490	73	115	95	330	1482	220	146	348	286	155	376	543	549	898
50	212	173	528	79	128	102	357	1479	220	135	359	286	155	376	551	557	899
55	240	188	577	86	146	111	391	1475	220	123	373	284	157	376	561	567	900

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ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
58	264	200	616	92	160	118	418	1473	220	115	382	283	159	376	569	575	901
63	294	213	664	99	178	126	452	1470	220	107	394	279	163	376	579	585	902
67	318	224	703	105	193	132	479	1468	220	101	403	277	167	376	587	593	903
71	344	234	742	111	208	138	506	1466	220	95	412	273	171	376	595	601	904
41	165	177	477	65	100	105	318	1500	205	152	315	329	108	351	483	489	905
46	192	198	530	73	116	117	354	1496	205	136	329	330	107	351	493	499	906
50	214	214	572	79	130	126	383	1493	205	126	339	330	107	351	501	507	907
55	243	233	624	86	147	138	419	1489	205	115	352	328	109	351	511	517	908
58	257	247	666	92	162	146	448	1487	205	108	361	326	111	351	519	525	909
63	297	265	719	99	180	157	484	1484	205	100	372	323	114	351	529	535	910
67	322	278	761	105	195	164	513	1483	205	94	381	320	117	351	537	543	911
71	348	290	803	111	211	172	542	1481	205	89	389	317	120	351	545	551	912
41	155	203	493	65	94	120	327	1506	199	147	287	367	76	341	433	439	913
46	181	227	548	73	109	134	365	1502	199	132	300	368	75	341	443	449	914
50	202	246	591	79	122	145	394	1499	199	122	310	366	75	341	451	457	915
55	229	268	646	86	139	158	432	1496	199	112	322	367	76	341	461	467	916
58	252	285	689	92	153	169	461	1494	199	104	331	366	77	341	469	475	917
63	291	305	743	99	170	181	499	1491	199	97	341	363	79	341	479	485	918
67	305	321	787	105	185	190	528	1489	199	91	350	360	82	341	487	493	919
71	330	336	830	111	200	199	558	1488	199	86	358	356	84	341	495	501	920
41	154	238	528	65	94	141	348	1517	187	139	269	405	50	321	393	399	921
46	180	266	586	73	109	158	387	1513	187	124	281	407	49	321	403	409	922
50	201	288	633	79	122	170	419	1510	187	115	291	407	49	321	411	417	923
55	229	314	691	86	139	186	459	1507	187	105	302	405	50	321	421	427	924
58	251	334	738	92	152	198	490	1505	187	98	311	404	51	321	429	435	925
63	281	359	796	99	170	212	530	1503	187	91	321	400	53	321	439	445	926
67	305	377	843	105	185	223	561	1501	187	86	329	397	55	321	447	453	927
71	330	395	889	111	200	234	593	1500	187	81	337	394	57	321	455	461	928
41	153	258	557	65	93	159	365	1526	179	132	254	435	33	306	363	369	929
46	179	300	619	73	108	177	407	1522	179	119	266	436	32	306	373	379	930
50	200	324	668	79	121	192	440	1519	179	110	275	436	32	306	381	387	931
55	227	354	730	86	138	209	481	1516	179	100	286	435	33	306	391	397	932
58	250	376	779	92	152	223	514	1514	179	94	295	433	34	306	399	405	933
63	280	404	840	99	169	239	556	1512	179	87	305	430	35	306	409	415	934
67	304	425	890	105	184	251	589	1510	179	82	313	427	37	306	417	423	935
71	329	445	939	111	200	263	622	1509	179	77	321	423	39	306	425	431	936
41	151	302	589	65	92	179	384	1534	170	126	239	466	17	291	334	339	937
46	177	338	654	73	107	200	428	1530	170	113	250	467	16	291	344	349	938
50	198	365	707	79	120	216	463	1527	170	104	259	467	17	291	352	357	939
55	225	398	772	86	137	235	506	1525	170	95	270	465	17	291	361	367	940
58	216	424	824	92	150	251	541	1523	170	89	278	463	18	291	369	375	941
63	278	454	889	99	168	269	585	1521	170	82	288	460	20	291	379	385	942
67	302	478	941	105	183	283	620	1519	170	78	296	457	21	291	387	393	943
71	328	501	993	111	199	297	655	1518	170	74	303	453	23	291	395	401	944
41	150	379	664	65	91	224	428	1550	152	113	213	523	- 7	261	284	289	945
46	176	422	738	73	107	250	477	1547	152	101	223	523	- 7	261	294	299	946
50	197	456	797	79	120	270	516	1544	152	93	232	523	- 7	261	302	307	947
55	225	497	871	86	137	294	565	1542	152	85	242	521	- 6	261	312	317	948
58	219	529	930	92	151	313	604	1540	152	80	250	518	- 5	261	320	325	949
63	279	567	1003	99	169	336	652	1538	152	74	259	515	- 4	261	330	335	950

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
67	304	597	1062	105	185	353	691	1537	152	70	267	511	- 2	261	338	343	951
71	331	626	1121	111	200	371	730	1535	152	66	274	507	- 1	261	346	351	952
41	167	139	441	65	101	82	297	1487	220	162	341	277	166	376	546	552	953
46	194	155	490	73	118	92	330	1482	220	146	356	278	165	376	556	562	954
50	217	168	528	79	131	99	357	1478	220	135	358	278	165	376	564	570	955
55	246	183	577	86	149	108	391	1475	220	123	381	276	167	376	574	580	956
58	269	194	616	92	163	115	419	1472	220	115	391	274	170	376	582	588	957
63	300	207	664	99	182	122	452	1470	220	107	402	271	174	376	592	598	958
67	325	217	703	105	197	128	479	1468	220	101	411	268	179	376	600	606	959
71	351	226	741	111	213	134	506	1466	220	95	420	265	183	376	608	614	960
41	169	172	477	65	103	102	318	1500	205	152	323	321	116	351	496	502	961
46	197	193	530	73	119	114	354	1495	205	136	337	322	115	351	506	512	962
50	220	208	572	79	133	123	383	1492	205	126	348	321	115	351	514	520	963
55	249	227	624	86	151	134	419	1489	205	115	360	320	117	351	524	530	964
58	273	241	366	92	166	142	448	1487	205	108	369	318	119	351	532	538	965
63	304	257	719	99	184	152	484	1484	205	100	381	315	122	351	542	548	966
67	330	270	761	105	200	160	513	1482	205	94	389	312	125	351	550	556	967
71	356	282	803	111	216	167	542	1481	205	89	398	308	129	351	558	564	968
41	159	138	493	65	97	117	327	1506	199	147	295	358	83	341	446	452	969
46	186	222	547	73	112	131	365	1502	199	132	309	360	81	341	456	462	970
50	207	240	591	79	126	142	394	1499	199	122	319	360	81	341	464	470	971
55	235	252	645	86	143	155	432	1495	199	112	330	359	82	341	474	480	972
58	256	278	689	92	157	165	461	1493	199	104	339	357	84	341	482	488	973
63	298	298	743	99	175	176	499	1491	199	97	350	354	86	341	492	498	974
67	313	313	787	105	189	185	528	1489	199	91	359	351	89	341	500	506	975
71	338	328	830	111	205	194	558	1487	199	86	367	348	92	341	508	514	976
41	159	233	528	65	96	138	348	1517	187	139	277	397	55	321	406	412	977
46	185	251	586	73	112	154	387	1513	187	124	290	398	54	321	416	422	978
50	207	282	633	79	126	167	419	1510	187	115	300	398	54	321	424	430	979
55	235	307	691	86	143	182	459	1507	187	105	311	396	55	321	434	440	980
58	259	327	738	92	157	193	490	1505	187	98	320	395	57	321	442	448	981
63	289	350	796	99	175	207	530	1503	187	91	330	391	59	321	452	458	982
67	313	369	843	105	190	218	561	1501	187	86	338	388	61	321	460	466	983
71	339	386	889	111	205	228	593	1499	187	81	346	385	63	321	468	474	984
41	158	263	557	65	96	156	365	1525	179	132	263	426	37	306	376	382	985
46	185	294	618	73	112	174	407	1521	179	119	275	428	37	306	386	392	986
50	206	318	668	79	125	188	440	1518	179	110	284	427	37	306	394	400	987
55	234	346	729	86	142	205	481	1516	179	100	295	426	38	306	404	410	988
58	256	368	779	92	156	218	514	1514	179	94	304	424	39	306	412	418	989
63	288	395	840	99	175	234	556	1511	179	87	314	421	41	306	422	428	990
67	313	416	389	105	190	246	589	1510	179	82	322	417	42	306	430	436	991
71	339	435	939	111	205	258	622	1508	179	77	330	414	44	306	438	444	992
41	157	297	589	65	95	175	384	1533	170	126	248	457	21	291	346	352	993
46	183	331	654	73	111	196	428	1530	170	113	259	458	21	291	356	362	994
50	205	358	706	79	124	212	463	1527	170	104	268	458	21	291	364	370	995
55	233	390	772	86	141	231	506	1524	170	95	279	456	22	291	374	380	996
58	256	415	824	92	155	246	541	1522	170	89	287	454	23	291	382	388	997
63	287	445	889	99	174	263	585	1520	170	82	297	450	24	291	392	398	998
67	312	468	941	105	189	277	620	1519	170	78	305	447	26	291	400	406	999
71	338	491	993	111	205	290	655	1517	170	74	313	444	28	291	408	414	1000

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
41	137	372	664	65	95	220	428	1550	152	113	222	514	-3	261	296	302	1001
46	183	415	738	73	111	245	477	1546	152	101	233	514	-4	261	306	312	1002
50	205	448	797	79	124	265	516	1544	152	93	241	513	-3	261	314	320	1003
55	234	488	871	86	142	289	565	1541	152	85	251	511	-2	261	324	330	1004
58	258	519	930	92	156	307	604	1540	152	80	259	509	-1	261	332	338	1005
63	289	557	1003	99	175	329	652	1538	152	74	269	505	0	261	342	348	1006
67	316	586	1062	105	191	347	691	1536	152	70	277	501	1	261	350	356	1007
71	342	614	1121	111	208	363	730	1535	152	66	284	498	3	261	358	364	1008
41	171	135	441	65	103	80	297	1486	220	162	348	269	177	376	558	564	1009
46	199	151	489	73	120	89	330	1481	220	146	364	270	176	376	568	574	1010
50	222	163	528	79	134	96	357	1478	220	135	376	270	176	376	576	582	1011
55	251	177	577	86	152	105	391	1474	220	123	389	268	179	376	586	592	1012
58	275	188	615	92	167	111	418	1472	220	115	399	266	182	376	594	600	1013
63	306	201	664	99	186	119	452	1469	220	107	411	263	186	376	604	610	1014
67	332	210	703	105	201	124	479	1467	220	101	420	260	191	376	612	618	1015
71	358	219	741	111	217	130	506	1466	220	95	429	256	196	376	620	626	1016
41	173	168	477	65	105	99	318	1500	205	152	331	313	124	351	508	514	1017
46	202	188	529	73	122	111	354	1495	205	136	345	314	123	351	518	524	1018
50	225	203	571	79	136	120	383	1492	205	126	356	313	124	351	526	532	1019
55	255	221	624	86	154	131	419	1489	205	115	369	311	126	351	536	542	1020
58	279	234	666	92	169	139	448	1486	205	108	378	309	128	351	544	550	1021
63	311	250	718	99	189	148	484	1484	205	100	389	306	131	351	554	560	1022
67	337	263	760	105	204	155	513	1482	205	94	398	303	135	351	562	568	1023
71	364	274	802	111	220	162	542	1480	205	89	407	299	139	351	570	576	1024
41	164	194	493	65	99	115	327	1506	199	147	303	350	89	341	458	464	1025
46	191	217	547	73	116	128	365	1501	199	132	317	352	88	341	468	474	1026
50	213	234	591	79	129	139	394	1498	199	122	327	351	88	341	476	482	1027
55	241	255	645	86	146	151	432	1495	199	112	339	350	89	341	486	492	1028
58	265	271	689	92	161	161	461	1493	199	104	348	346	91	341	494	500	1029
63	295	291	743	99	179	172	499	1490	199	97	359	345	94	341	504	510	1030
67	320	305	786	105	194	181	528	1489	199	91	368	342	96	341	512	518	1031
71	346	319	830	111	210	189	558	1487	199	86	376	339	99	341	520	526	1032
41	164	228	528	65	99	135	348	1517	187	139	286	388	61	321	418	424	1033
46	191	255	586	73	116	151	387	1512	187	124	299	389	60	321	428	434	1034
50	213	276	633	79	129	163	419	1510	187	115	308	389	60	321	436	442	1035
55	242	300	691	86	147	178	459	1507	187	105	320	388	61	321	446	452	1036
58	266	320	738	92	161	189	490	1504	187	98	329	386	63	321	454	460	1037
63	296	342	796	99	180	203	530	1502	187	91	339	382	65	321	464	470	1038
67	322	360	842	105	195	213	561	1500	187	86	347	379	67	321	472	478	1039
71	348	377	889	111	211	223	593	1499	187	81	355	376	69	321	480	486	1040
41	164	258	557	65	99	152	365	1525	179	132	272	418	42	306	388	394	1041
46	190	288	618	73	115	170	407	1521	179	119	284	419	42	306	398	404	1042
50	213	311	668	79	129	184	440	1518	179	110	293	418	42	305	406	412	1043
55	242	339	729	86	146	201	481	1515	179	100	304	417	43	306	416	422	1044
58	266	361	778	92	161	213	514	1513	179	94	313	415	44	306	424	430	1045
63	296	387	840	99	180	229	556	1511	179	87	323	411	46	306	434	440	1046
67	322	406	889	105	195	240	589	1509	179	82	331	408	48	306	442	448	1047
71	348	426	938	111	211	252	622	1508	179	77	339	405	50	306	450	456	1048
41	163	231	589	65	99	172	384	1533	170	126	257	448	26	291	358	364	1049
46	189	325	654	73	115	192	428	1529	170	113	268	449	25	291	368	374	1050

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
50	212	351	706	79	128	208	463	1527	170	104	277	449	25	291	376	382	1051
55	241	382	771	86	146	226	506	1524	170	95	288	447	26	291	386	392	1052
58	265	407	824	92	160	241	541	1522	170	.89	296	445	27	291	394	400	1053
63	295	436	889	99	179	258	585	1520	170	82	307	441	29	291	404	410	1054
67	322	459	941	105	195	271	620	1518	170	78	315	438	31	291	412	418	1055
71	348	480	993	111	211	284	655	1517	170	74	322	434	33	291	420	426	1056
41	153	365	664	65	99	216	428	1549	152	113	231	504	0	261	309	314	1057
46	190	407	738	73	115	241	477	1546	152	101	242	505	0	261	319	324	1058
50	213	440	797	79	129	260	516	1544	152	93	250	504	0	261	327	332	1059
55	243	479	870	86	147	283	565	1541	152	85	261	502	1	261	337	342	1060
58	268	509	929	92	162	301	604	1539	152	80	269	499	2	261	345	350	1061
63	300	546	1003	99	182	323	652	1537	152	74	279	495	4	261	354	360	1062
67	327	575	1062	105	198	340	691	1536	152	70	286	492	5	261	362	368	1063
71	354	602	1121	111	215	356	730	1535	152	66	294	488	7	261	370	376	1064
41	174	131	441	65	106	78	297	1486	220	162	356	262	188	376	571	577	1065
46	203	146	489	73	123	87	330	1481	220	146	372	262	187	376	581	587	1066
50	226	158	528	79	137	94	357	1478	220	135	384	262	188	376	589	595	1067
55	256	172	577	86	155	102	391	1474	220	123	397	260	191	376	599	605	1068
58	281	182	615	92	170	108	418	1472	220	115	407	258	194	376	607	613	1069
63	313	194	664	99	189	115	452	1469	220	107	419	254	199	376	617	623	1070
67	338	203	702	105	205	120	479	1467	220	101	428	251	204	376	625	631	1071
71	365	212	741	111	221	125	506	1465	220	95	437	248	210	376	633	639	1072
41	178	164	477	65	108	97	318	1499	205	152	339	305	133	351	521	527	1073
46	207	183	529	73	125	108	354	1495	205	136	353	305	132	351	531	537	1074
50	230	197	571	79	140	117	383	1492	205	126	364	305	133	351	539	545	1075
55	261	215	624	86	158	127	419	1488	205	115	377	303	135	351	549	555	1076
58	285	228	666	92	173	135	448	1486	205	108	387	301	137	351	557	563	1077
63	318	243	718	99	193	144	484	1483	205	100	398	297	141	351	567	573	1078
67	345	255	760	105	209	151	513	1482	205	94	407	294	145	351	575	581	1079
71	372	266	802	111	225	157	542	1480	205	89	415	290	149	351	583	589	1080
41	158	189	493	65	102	112	327	1505	199	147	311	342	96	341	471	477	1081
46	196	212	547	73	119	125	365	1501	199	132	325	343	95	341	481	487	1082
50	216	229	591	79	132	135	394	1498	199	122	336	343	95	341	489	495	1083
55	218	249	645	86	150	147	432	1495	199	112	348	341	97	341	499	505	1084
58	272	265	689	92	165	157	461	1493	199	104	357	339	99	341	507	513	1085
63	303	283	743	99	183	168	499	1490	199	97	368	336	101	341	517	523	1086
67	326	297	786	105	199	176	528	1488	199	91	376	333	104	341	525	531	1087
71	354	311	830	111	215	184	558	1487	199	86	385	330	107	341	533	539	1088
41	159	223	528	65	102	132	348	1516	187	139	294	380	67	321	431	437	1089
46	196	249	586	73	119	148	387	1512	187	124	307	381	66	321	441	447	1090
50	219	269	633	79	133	159	419	1509	187	115	317	380	66	321	449	455	1091
55	249	294	691	86	151	174	459	1506	187	105	329	379	67	321	459	465	1092
58	273	312	737	92	165	185	490	1504	187	98	337	377	69	321	467	473	1093
63	304	334	796	99	184	198	530	1502	187	91	348	373	71	321	477	483	1094
67	330	351	842	105	200	208	561	1500	187	86	356	370	74	321	485	491	1095
71	357	358	889	111	216	217	593	1499	187	81	365	367	76	321	493	499	1096
41	169	252	557	65	102	149	365	1524	179	132	280	409	47	306	401	407	1097
46	196	282	618	73	119	167	407	1520	179	119	293	410	47	306	411	417	1098
50	219	304	667	79	133	180	440	1518	179	110	302	410	47	306	419	425	1099
55	249	332	729	86	151	196	481	1515	179	100	313	406	48	306	429	435	1100

ONE POCKET MIXES AMERICAN CONCRETE INSTITUTE 1055

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
58	273	353	778	92	166	209	514	1513	179	94	322	406	50	305	437	443	1101
63	305	378	840	99	185	224	556	1511	179	87	332	402	52	306	447	453	1102
67	331	337	889	105	201	235	589	1505	179	82	341	399	54	306	455	461	1103
71	358	416	938	111	217	246	622	1508	179	77	349	395	56	306	463	469	1104
41	168	235	589	65	102	169	384	1533	170	126	265	439	30	291	371	377	1105
46	196	318	654	73	119	188	428	1529	170	113	277	440	30	291	381	387	1106
50	219	344	706	79	132	203	463	1526	170	104	286	440	30	291	389	395	1107
55	246	374	771	86	150	222	506	1524	170	95	297	438	31	291	399	405	1108
58	273	398	823	92	165	236	541	1522	170	89	306	435	32	291	407	413	1109
63	305	427	889	99	185	252	585	1519	170	82	316	432	34	291	417	423	1110
67	331	449	941	105	201	265	620	1518	170	78	324	428	36	291	425	431	1111
71	358	470	993	111	217	278	655	1517	170	74	332	425	38	291	433	439	1112
41	170	359	664	65	103	212	428	1549	152	112	240	495	4	261	321	327	1113
46	198	400	737	73	120	236	477	1545	152	101	251	495	4	261	331	337	1114
50	221	431	796	79	134	255	516	1543	152	93	260	494	4	261	339	345	1115
55	252	470	870	86	153	278	565	1541	152	85	270	492	5	261	349	355	1116
58	277	499	929	92	168	296	604	1539	152	80	278	490	6	261	357	363	1117
63	310	535	1003	99	188	317	652	1537	152	74	288	486	8	261	367	373	1118
67	338	563	1062	105	205	333	691	1536	152	70	296	482	10	261	375	381	1119
71	366	590	1120	111	222	349	730	1534	152	66	304	478	11	261	383	389	1120

ACI MIXES W/C AND A/C

1135

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
1	44	389	2	49	443	3	53	486	4	58	540
5	62	583	6	67	637	7	71	680	8	75	723
9	44	438	10	49	497	11	53	545	12	58	604
13	62	651	14	67	711	15	71	758	16	75	805
17	44	460	18	49	521	19	53	571	20	58	633
21	62	682	22	67	744	23	71	793	24	75	843
25	44	507	26	49	575	27	53	629	28	58	696
29	62	750	30	67	817	31	71	871	32	75	924
33	44	548	34	49	620	35	53	678	36	58	749
37	62	807	38	67	879	39	71	936	40	75	994
41	44	594	42	49	671	43	53	733	44	58	810
45	62	871	46	67	948	47	71	1010	48	75	1071
49	44	703	50	49	793	51	53	865	52	58	954
53	62	1026	54	67	1115	55	71	1187	56	75	1258
57	44	389	58	49	443	59	53	486	60	58	540
61	62	583	62	67	637	63	71	680	64	75	723
65	44	438	66	49	497	67	53	544	68	58	604
69	62	651	70	67	710	71	71	758	72	75	805
73	44	459	74	49	521	75	53	571	76	58	633
77	62	682	78	67	744	79	71	793	80	75	842
81	44	507	82	49	575	83	53	628	84	58	696
85	62	749	86	67	817	87	71	870	88	75	924
89	44	548	90	49	620	91	53	677	92	58	749
93	62	807	94	67	878	95	71	936	96	75	993
97	44	594	98	49	671	99	53	732	100	58	809
101	62	871	102	67	948	103	71	1009	104	75	1071
105	44	703	106	49	793	107	53	864	108	58	954
109	62	1025	110	67	1115	111	71	1186	112	75	1258
113	44	389	114	49	443	115	53	486	116	58	540
117	62	583	118	67	637	119	71	680	120	75	723
121	44	437	122	49	497	123	53	544	124	58	603
125	62	651	126	67	710	127	71	757	128	75	805
129	44	459	130	49	521	131	53	571	132	58	632
133	62	682	134	67	743	135	71	793	136	75	842
137	44	507	138	49	574	139	53	628	140	58	695
141	62	749	142	67	816	143	71	870	144	75	924
145	44	548	146	49	620	147	53	677	148	58	749
149	62	806	150	67	878	151	71	936	152	75	993
153	44	593	154	49	670	155	53	732	156	58	809
157	62	871	158	67	948	159	71	1009	160	75	1071
161	44	703	162	49	793	163	53	864	164	58	954
165	62	1025	166	67	1114	167	71	1186	168	75	1257
169	44	389	170	49	443	171	53	486	172	58	540
173	62	583	174	67	636	175	71	679	176	75	722
177	44	437	178	49	497	179	53	544	180	58	603
181	62	651	182	67	710	183	71	757	184	75	805
185	44	459	186	49	521	187	53	570	188	58	632
189	62	682	190	67	743	191	71	793	192	75	842
193	44	507	194	49	574	195	53	628	196	58	695
197	62	749	198	67	816	199	71	870	200	75	923
201	44	548	202	49	620	203	53	677	204	58	749
205	62	806	206	67	878	207	71	935	208	75	993

ACI MIXES W/C AND A/C

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
209	44	593	210	49	670	211	53	732	212	58	809
213	62	870	214	67	947	215	71	1009	216	75	1070
217	44	703	218	49	792	219	53	864	220	58	953
221	62	1025	222	67	1114	223	71	1185	224	75	1257
225	44	389	226	49	443	227	53	486	228	58	539
229	62	582	230	67	636	231	71	679	232	75	722
233	44	437	234	49	496	235	53	544	236	58	603
237	62	650	238	67	710	239	71	757	240	75	804
241	44	459	242	49	521	243	53	570	244	58	632
245	62	681	246	67	743	247	71	792	248	75	842
249	44	507	250	49	574	251	53	628	252	58	695
253	62	749	254	67	816	255	71	870	256	75	923
257	44	548	258	49	619	259	53	677	260	58	749
261	62	806	262	67	878	263	71	935	264	75	992
265	44	593	266	49	670	267	53	732	268	58	809
269	62	870	270	67	947	271	71	1008	272	75	1070
273	44	703	274	49	792	275	53	864	276	58	953
277	62	1024	278	67	1114	279	71	1185	280	75	1256
281	44	348	282	49	397	283	53	436	284	58	485
285	62	525	286	67	574	287	71	613	288	75	652
289	44	389	290	49	443	291	53	486	292	58	540
293	62	583	294	67	637	295	71	680	296	75	723
297	44	408	298	49	464	299	53	509	300	58	565
301	62	610	302	67	665	303	71	710	304	75	755
305	44	449	306	49	509	307	53	558	308	58	618
309	62	667	310	67	727	311	71	776	312	75	824
313	44	483	314	49	547	315	53	599	316	58	663
317	62	715	318	67	779	319	71	831	320	75	882
321	44	521	322	49	589	323	53	644	324	58	713
325	62	768	326	67	837	327	71	892	328	75	947
329	44	610	330	49	689	331	53	752	332	58	831
333	62	894	334	67	973	335	71	1036	336	75	1099
337	44	348	338	49	397	339	53	436	340	58	485
341	62	524	342	67	573	343	71	613	344	75	652
345	44	389	346	49	443	347	53	486	348	58	540
349	62	583	350	67	637	351	71	680	352	75	723
353	44	408	354	49	464	355	53	509	356	58	565
357	62	609	358	67	665	359	71	710	360	75	755
361	44	448	362	49	509	363	53	558	364	58	618
365	62	667	366	67	727	367	71	775	368	75	824
369	44	483	370	49	547	371	53	599	372	58	663
373	62	715	374	67	779	375	71	830	376	75	882
377	44	520	378	49	589	379	53	644	380	58	713
381	62	768	382	67	836	383	71	891	384	75	946
385	44	610	386	49	689	387	53	752	388	58	831
389	62	894	390	67	973	391	71	1036	392	75	1099
393	44	348	394	49	397	395	53	436	396	58	485
397	62	524	398	67	573	399	71	612	400	75	652
401	44	389	402	49	443	403	53	486	404	58	540
405	62	583	406	67	637	407	71	680	408	75	723
409	44	408	410	49	464	411	53	509	412	58	564
413	62	609	414	67	665	415	71	710	416	75	754

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
417	44	448	418	49	509	419	53	557	420	58	618
421	62	666	422	67	727	423	71	775	424	75	823
425	44	482	426	49	547	427	53	598	428	58	663
429	62	714	430	67	779	431	71	830	432	75	882
433	44	520	434	49	589	435	53	644	436	58	713
437	62	768	438	67	836	439	71	891	440	75	946
441	44	610	442	49	689	443	53	752	444	58	831
445	62	394	446	67	972	447	71	1035	448	75	1098
449	44	347	450	49	397	451	53	436	452	58	485
453	62	524	454	67	573	455	71	612	456	75	651
457	44	389	458	49	443	459	53	486	460	58	540
461	62	583	462	67	636	463	71	679	464	75	722
465	44	408	466	49	464	467	53	508	468	58	564
469	62	609	470	67	665	471	71	710	472	75	754
473	44	448	474	49	509	475	53	557	476	58	618
477	62	666	478	67	727	479	71	775	480	75	823
481	44	482	482	49	547	483	53	598	484	58	663
485	62	714	486	67	778	487	71	830	488	75	881
489	44	520	490	49	589	491	53	644	492	58	712
493	62	767	494	67	836	495	71	891	496	75	946
497	44	609	498	49	688	499	53	751	500	58	830
501	62	393	502	67	972	503	71	1035	504	75	1098
505	44	347	506	49	396	507	53	436	508	58	485
509	62	524	510	67	573	511	71	612	512	75	651
513	44	389	514	49	443	515	53	486	516	58	539
517	62	582	518	67	636	519	71	679	520	75	722
521	44	408	522	49	464	523	53	508	524	58	564
525	62	609	526	67	665	527	71	709	528	75	754
529	44	443	530	49	509	531	53	557	532	58	618
533	62	666	534	67	726	535	71	775	536	75	823
537	44	482	538	49	547	539	53	598	540	58	662
541	62	714	542	67	778	543	71	830	544	75	881
545	44	520	546	49	589	547	53	644	548	58	712
549	62	757	550	67	836	551	71	891	552	75	945
553	44	609	554	49	688	555	53	751	556	58	830
557	62	393	558	67	972	559	71	1035	560	75	1098
561	44	364	562	49	415	563	53	455	564	58	506
565	62	547	566	67	598	567	71	639	568	75	679
569	44	408	570	49	464	571	53	508	572	58	564
573	62	609	574	67	665	575	71	710	576	75	754
577	44	428	578	49	486	579	53	532	580	58	591
581	62	637	582	67	695	583	71	742	584	75	788
585	44	471	586	49	534	587	53	584	588	58	648
589	62	698	590	67	761	591	71	811	592	75	862
593	44	507	594	49	575	595	53	629	596	58	696
597	62	750	598	67	817	599	71	871	600	75	924
601	44	548	602	49	620	603	53	678	604	58	749
605	62	307	606	67	879	607	71	936	608	75	994
609	44	645	610	49	728	611	53	794	612	58	877
613	62	343	614	67	1026	615	71	1092	616	75	1158
617	44	364	618	49	414	619	53	455	620	58	506
621	62	547	622	67	598	623	71	638	624	75	679

ACI MIXES W/C AND A/C

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
625	44	408	626	49	464	627	53	508	628	58	564
629	62	609	630	67	665	631	71	709	632	75	754
633	44	428	634	49	486	635	53	532	636	58	591
637	62	637	638	67	695	639	71	742	640	75	788
641	44	471	642	49	534	643	53	584	644	58	647
645	62	698	646	67	761	647	71	811	648	75	862
649	44	507	650	49	575	651	53	628	652	58	696
653	62	749	654	67	817	655	71	870	656	75	924
657	44	548	658	49	620	659	53	677	660	58	749
661	62	807	662	67	878	663	71	936	664	75	993
665	44	645	666	49	728	667	53	794	668	58	877
669	62	943	670	67	1026	671	71	1092	672	75	1158
673	44	363	674	49	414	675	53	455	676	58	506
677	62	547	678	67	597	679	71	638	680	75	679
681	44	408	682	49	463	683	53	508	684	58	564
685	62	609	686	67	665	687	71	709	688	75	754
689	44	427	690	49	486	691	53	532	692	58	590
693	62	637	694	67	695	695	71	741	696	75	788
697	44	471	698	49	534	699	53	584	700	58	647
701	62	698	702	67	761	703	71	811	704	75	861
705	44	507	706	49	574	707	53	628	708	58	695
709	62	749	710	67	816	711	71	870	712	75	924
713	44	548	714	49	620	715	53	677	716	58	749
717	62	806	718	67	878	719	71	936	720	75	993
721	44	645	722	49	728	723	53	794	724	58	877
725	62	943	726	67	1026	727	71	1092	728	75	1158
729	44	363	730	49	414	731	53	455	732	58	506
733	62	546	734	67	597	735	71	638	736	75	679
737	44	407	738	49	463	739	53	508	740	58	564
741	62	609	742	67	664	743	71	709	744	75	754
745	44	427	746	49	485	747	53	532	748	58	590
749	62	637	750	67	695	751	71	741	752	75	788
753	44	470	754	49	534	755	53	584	756	58	647
757	62	697	758	67	760	759	71	811	760	75	861
761	44	507	762	49	574	763	53	628	764	58	695
765	62	749	766	67	816	767	71	870	768	75	923
769	44	548	770	49	620	771	53	677	772	58	749
773	62	806	774	67	878	775	71	935	776	75	993
777	44	544	778	49	727	779	53	794	780	58	876
781	62	943	782	67	1025	783	71	1091	784	75	1157
785	44	363	786	49	414	787	53	455	788	58	506
789	62	546	790	67	597	791	71	638	792	75	678
793	44	407	794	49	463	795	53	508	796	58	564
797	62	608	798	67	664	799	71	709	800	75	753
801	44	427	802	49	485	803	53	532	804	58	590
805	62	636	806	67	695	807	71	741	808	75	787
809	44	470	810	49	533	811	53	584	812	58	647
813	62	697	814	67	760	815	71	810	816	75	861
817	44	507	818	49	574	819	53	628	820	58	695
821	62	749	822	67	816	823	71	870	824	75	923
825	44	548	826	49	619	827	53	677	828	58	749
829	62	806	830	67	878	831	71	935	832	75	992

ACI MIXES W/C AND A/C

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
833	44	644	834	49	727	835	53	793	836	58	876
837	62	942	838	67	1025	839	71	1091	840	75	1157
841	44	325	842	49	372	843	53	409	844	58	456
845	62	493	846	67	540	847	71	577	848	75	614
849	44	364	850	49	415	851	53	455	852	58	506
853	62	547	854	67	598	855	71	639	856	75	679
857	44	381	858	49	434	859	53	476	860	58	529
861	62	571	862	67	624	863	71	666	864	75	708
865	44	418	866	49	475	867	53	520	868	58	578
869	62	623	870	67	680	871	71	726	872	75	771
873	44	449	874	49	509	875	53	558	876	58	618
877	62	667	878	67	727	879	71	776	880	75	824
881	44	483	882	49	547	883	53	599	884	58	663
885	62	715	886	67	779	887	71	831	888	75	882
889	44	563	890	49	636	891	53	695	892	58	769
893	62	827	894	67	901	895	71	959	896	75	1018
897	44	325	898	49	372	899	53	409	900	58	456
901	62	493	902	67	540	903	71	577	904	75	614
905	44	364	906	49	414	907	53	455	908	58	506
909	62	547	910	67	598	911	71	638	912	75	679
913	44	381	914	49	434	915	53	476	916	58	529
917	62	571	918	67	624	919	71	666	920	75	708
921	44	418	922	49	475	923	53	520	924	58	577
925	62	623	926	67	680	927	71	726	928	75	771
929	44	448	930	49	509	931	53	558	932	58	618
933	62	667	934	67	727	935	71	775	936	75	824
937	44	483	938	49	547	939	53	599	940	58	663
941	62	715	942	67	779	943	71	830	944	75	882
945	44	562	946	49	636	947	53	695	948	58	768
949	62	827	950	67	900	951	71	959	952	75	1018
953	44	325	954	49	372	955	53	409	956	58	456
957	62	493	958	67	539	959	71	577	960	75	614
961	44	363	962	49	414	963	53	455	964	58	506
965	62	547	966	67	597	967	71	638	968	75	679
969	44	381	970	49	433	971	53	476	972	58	529
973	62	571	974	67	624	975	71	666	976	75	708
977	44	417	978	49	475	979	53	520	980	58	577
981	62	623	982	67	680	983	71	725	984	75	771
985	44	448	986	49	509	987	53	557	988	58	618
989	62	665	990	67	727	991	71	775	992	75	823
993	44	482	994	49	547	995	53	598	996	58	663
997	62	714	998	67	779	999	71	830	1000	75	882
1001	44	562	1002	49	636	1003	53	695	1004	58	768
1005	62	827	1006	67	900	1007	71	959	1008	75	1018
1009	44	325	1010	49	372	1011	53	409	1012	58	456
1013	62	493	1014	67	539	1015	71	576	1016	75	614
1017	44	363	1018	49	414	1019	53	455	1020	58	506
1021	62	546	1022	67	597	1023	71	638	1024	75	679
1025	44	380	1026	49	433	1027	53	476	1028	58	528
1029	62	571	1030	67	623	1031	71	666	1032	75	708
1033	44	417	1034	49	474	1035	53	520	1036	58	577
1037	62	623	1038	67	680	1039	71	725	1040	75	771

ACI MIXES W/C AND A/C

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
1041	44	445	1042	49	509	1043	53	557	1044	58	618
1045	62	566	1046	67	727	1047	71	775	1048	75	823
1049	44	482	1050	49	547	1051	53	598	1052	58	663
1053	62	714	1054	67	778	1055	71	830	1056	75	881
1057	44	562	1058	49	636	1059	53	694	1060	58	768
1061	62	327	1062	67	900	1063	71	959	1064	75	1017
1065	44	325	1066	49	372	1067	53	409	1068	58	455
1069	62	493	1070	67	539	1071	71	576	1072	75	613
1073	44	363	1074	49	414	1075	53	455	1076	58	506
1077	62	546	1073	67	597	1079	71	638	1080	75	678
1081	44	380	1082	49	433	1083	53	475	1084	58	528
1085	62	570	1086	67	623	1087	71	665	1088	75	708
1089	44	417	1090	49	474	1091	53	520	1092	58	577
1093	62	522	1094	67	679	1095	71	725	1096	75	770
1097	44	448	1093	49	509	1099	53	557	1100	58	618
1101	62	566	1102	67	726	1103	71	775	1104	75	823
1105	44	482	1106	49	547	1107	53	598	1108	58	662
1109	62	714	1110	67	778	1111	71	830	1112	75	881
1113	44	562	1114	49	635	1115	53	694	1116	58	768
1117	62	326	1113	67	900	1119	71	958	1120	75	1017

1025

	W/C 0.44		W/C 0.49		W/C 0.53		W/C 0.58		W/C 0.62		W/C 0.67		W/C 0.71		W/C 0.75	
FM	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J
2.00	458	1	448	2	441	3	435	4	431	5	426	6	423	7	420	8
2.00	440	9	431	10	426	11	420	12	417	13	413	14	410	15	408	16
2.00	433	17	425	18	420	19	415	20	411	21	407	22	405	23	402	24
2.00	420	25	413	26	409	27	404	28	401	29	397	30	395	31	393	32
2.00	411	33	405	34	400	35	396	36	393	37	390	38	388	39	386	40
2.00	402	41	396	42	393	43	389	44	386	45	383	46	382	47	380	48
2.00	366	49	381	50	378	51	375	52	373	53	371	54	369	55	368	56
2.25	458	57	448	58	442	59	435	60	431	61	426	62	423	63	420	64
2.25	440	65	432	66	426	67	421	68	417	69	413	70	410	71	408	72
2.25	433	73	425	74	420	75	415	76	411	77	407	78	405	79	403	80
2.25	420	81	413	82	409	83	404	84	401	85	398	86	395	87	393	88
2.25	411	89	405	90	401	91	396	92	393	93	390	94	388	95	387	96
2.25	402	97	397	98	393	99	389	100	386	101	384	102	382	103	380	104
2.25	366	105	381	106	378	107	375	108	373	109	371	110	369	111	368	112
2.50	458	113	448	114	442	115	435	116	431	117	426	118	423	119	420	120
2.50	440	121	432	122	426	123	421	124	417	125	413	126	410	127	408	128
2.50	433	129	425	130	420	131	415	132	411	133	408	134	405	135	403	136
2.50	420	137	413	138	409	139	404	140	401	141	398	142	395	143	393	144
2.50	411	145	405	146	401	147	396	148	394	149	391	150	389	151	387	152
2.50	402	153	397	154	393	155	389	156	386	157	384	158	382	159	380	160
2.50	366	161	381	162	378	163	375	164	373	165	371	166	369	167	368	168
2.75	458	169	448	170	442	171	435	172	431	173	426	174	423	175	421	176
2.75	440	177	432	178	426	179	421	180	417	181	413	182	410	183	408	184
2.75	433	185	425	186	420	187	415	188	411	189	408	190	405	191	403	192
2.75	420	193	413	194	409	195	404	196	401	197	398	198	396	199	394	200
2.75	411	201	405	202	401	203	397	204	394	205	391	206	389	207	387	208
2.75	403	209	397	210	393	211	389	212	387	213	384	214	382	215	380	216
2.75	366	217	381	218	378	219	375	220	373	221	371	222	369	223	368	224
3.00	459	225	448	226	442	227	435	228	431	229	427	230	423	231	421	232
3.00	441	233	432	234	427	235	421	236	417	237	413	238	410	239	408	240
3.00	433	241	425	242	420	243	415	244	412	245	408	246	405	247	403	248
3.00	421	249	414	250	409	251	404	252	401	253	398	254	396	255	394	256
3.00	411	257	405	258	401	259	397	260	394	261	391	262	389	263	387	264
3.00	403	265	397	266	393	267	389	268	387	269	384	270	382	271	380	272
3.00	366	273	382	274	378	275	375	276	373	277	371	278	369	279	368	280

ACI TABLES   DA/A/ONE INCH CHANGE IN SLUMP   ANGULAR COARSE AGGREGATE AND NATURAL SAND

	W/C 0.44		W/C 0.49		W/C 0.53		W/C 0.58		W/C 0.62		W/C 0.67		W/C 0.71		W/C 0.75	
FM	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J
2.00	477	281	465	282	458	283	450	284	445	285	440	286	437	287	433	288
2.00	458	289	448	290	441	291	435	292	431	293	426	294	423	295	420	296
2.00	450	297	441	298	435	299	429	300	425	301	420	302	417	303	415	304
2.00	436	305	428	306	423	307	417	308	414	309	410	310	407	311	405	312
2.00	426	313	419	314	414	315	409	316	406	317	402	318	400	319	398	320
2.00	417	321	410	322	406	323	401	324	398	325	395	326	393	327	391	328
2.00	399	329	394	330	390	331	386	332	384	333	381	334	380	335	378	336
2.25	477	337	465	338	458	339	451	340	446	341	440	342	437	343	434	344
2.25	458	345	448	346	442	347	435	348	431	349	426	350	423	351	420	352
2.25	450	353	441	354	435	355	429	356	425	357	420	358	417	359	415	360
2.25	436	361	428	362	423	363	417	364	414	365	410	366	407	367	405	368
2.25	427	369	419	370	414	371	409	372	406	373	402	374	400	375	398	376
2.25	417	377	410	378	406	379	401	380	398	381	395	382	393	383	391	384
2.25	400	385	394	386	390	387	387	388	384	389	381	390	380	391	378	392
2.50	477	393	465	394	458	395	451	396	446	397	440	398	437	399	434	400
2.50	458	401	448	402	442	403	435	404	431	405	426	406	423	407	420	408
2.50	450	409	441	410	435	411	429	412	425	413	421	414	418	415	415	416
2.50	437	417	428	418	423	419	418	420	414	421	410	422	407	423	405	424
2.50	427	425	419	426	414	427	409	428	406	429	403	430	400	431	398	432
2.50	417	433	410	434	406	435	402	436	398	437	395	438	393	439	391	440
2.50	400	441	394	442	390	443	387	444	384	445	382	446	380	447	378	448
2.75	477	449	465	450	458	451	451	452	446	453	441	454	437	455	434	456
2.75	458	457	448	458	442	459	435	460	431	461	426	462	423	463	421	464
2.75	451	465	441	466	435	467	429	468	425	469	421	470	418	471	415	472
2.75	437	473	428	474	423	475	418	476	414	477	410	478	408	479	405	480
2.75	427	481	419	482	414	483	409	484	406	485	403	486	400	487	398	488
2.75	417	489	411	490	406	491	402	492	399	493	395	494	393	495	391	496
2.75	400	497	394	498	391	499	387	500	384	501	382	502	380	503	378	504
3.00	477	505	465	506	458	507	451	508	446	509	441	510	437	511	434	512
3.00	458	513	448	514	442	515	435	516	431	517	427	518	423	519	421	520
3.00	451	521	441	522	435	523	429	524	425	525	421	526	418	527	415	528
3.00	437	529	429	530	423	531	418	532	414	533	410	534	408	535	405	536
3.00	427	537	419	538	415	539	410	540	406	541	403	542	400	543	398	544
3.00	418	545	411	546	406	547	402	548	399	549	396	550	393	551	391	552
3.00	400	553	394	554	391	555	387	556	384	557	382	558	380	559	378	560

1027

	W/C 0.44		W/C 0.49		W/C 0.53		W/C 0.58		W/C 0.62		W/C 0.67		W/C 0.71		W/C 0.75	
FM	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J
2.00	469	561	458	562	451	563	444	564	439	565	434	566	431	567	428	568
2.00	450	569	441	570	435	571	429	572	425	573	421	574	418	575	415	576
2.00	443	577	434	578	429	579	423	580	419	581	415	582	412	583	410	584
2.00	430	585	422	586	417	587	412	588	408	589	405	590	402	591	400	592
2.00	420	593	413	594	409	595	404	596	401	597	397	598	395	599	393	600
2.00	411	601	405	602	400	603	396	604	393	605	390	606	388	607	386	608
2.00	394	609	389	610	385	611	382	612	379	613	377	614	375	615	374	616
2.25	469	617	458	618	451	619	444	620	440	621	435	622	431	623	428	624
2.25	451	625	441	626	435	627	429	628	425	629	421	630	418	631	415	632
2.25	443	633	434	634	429	635	423	636	419	637	415	638	412	639	410	640
2.25	430	641	422	642	417	643	412	644	409	645	405	646	403	647	400	648
2.25	420	649	413	650	409	651	404	652	401	653	398	654	395	655	393	656
2.25	411	657	405	658	401	659	396	660	393	661	390	662	388	663	387	664
2.25	394	665	389	666	385	667	382	668	380	669	377	670	375	671	374	672
2.50	469	673	458	674	451	675	444	676	440	677	435	678	431	679	428	680
2.50	451	681	441	682	435	683	429	684	425	685	421	686	418	687	415	688
2.50	443	689	435	690	429	691	423	692	419	693	415	694	412	695	410	696
2.50	430	697	422	698	417	699	412	700	409	701	405	702	403	703	400	704
2.50	420	705	413	706	409	707	404	708	401	709	398	710	395	711	393	712
2.50	411	713	405	714	401	715	396	716	394	717	391	718	389	719	387	720
2.50	394	721	389	722	385	723	382	724	380	725	377	726	375	727	374	728
2.75	469	729	459	730	452	731	444	732	440	733	435	734	431	735	428	736
2.75	451	737	441	738	436	739	429	740	425	741	421	742	418	743	415	744
2.75	444	745	435	746	429	747	423	748	419	749	415	750	413	751	410	752
2.75	430	753	422	754	417	755	412	756	409	757	405	758	403	759	401	760
2.75	420	761	413	762	409	763	404	764	401	765	398	766	396	767	394	768
2.75	411	769	405	770	401	771	397	772	394	773	391	774	389	775	387	776
2.75	394	777	389	778	386	779	382	780	380	781	377	782	376	783	374	784
3.00	470	785	459	786	452	787	445	788	440	789	435	790	432	791	429	792
3.00	451	793	442	794	436	795	429	796	425	797	421	798	418	799	416	800
3.00	444	801	435	802	429	803	423	804	420	805	415	806	413	807	410	808
3.00	430	809	423	810	418	811	412	812	409	813	405	814	403	815	401	816
3.00	421	817	414	818	409	819	404	820	401	821	398	822	396	823	394	824
3.00	411	825	405	826	401	827	397	828	394	829	391	830	389	831	387	832
3.00	394	833	389	834	386	835	382	836	380	837	377	838	376	839	374	840

	W/C 0.44		W/C 0.49		W/C 0.53		W/C 0.58		W/C 0.62		W/C 0.67		W/C 0.71		W/C 0.75	
FM	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J	ALT	J
2.00	489	841	476	842	468	843	460	844	455	845	449	846	445	847	442	848
2.00	469	849	458	850	451	851	444	852	439	853	434	854	431	855	428	856
2.00	461	857	451	858	444	859	438	860	433	861	428	862	425	863	422	864
2.00	447	865	438	866	432	867	426	868	422	869	418	870	415	871	412	872
2.00	436	873	428	874	423	875	417	876	414	877	410	878	407	879	405	880
2.00	426	881	419	882	414	883	409	884	406	885	402	886	400	887	398	888
2.00	408	889	402	890	398	891	394	892	391	893	388	894	386	895	384	896
2.25	489	897	477	898	469	899	460	900	455	901	449	902	445	903	442	904
2.25	469	905	458	906	451	907	444	908	440	909	435	910	431	911	428	912
2.25	461	913	451	914	444	915	438	916	433	917	429	918	425	919	423	920
2.25	447	921	438	922	432	923	426	924	422	925	418	926	415	927	412	928
2.25	436	929	429	930	423	931	417	932	414	933	410	934	407	935	405	936
2.25	427	937	419	938	414	939	409	940	406	941	402	942	400	943	398	944
2.25	408	945	402	946	398	947	394	948	391	949	388	950	386	951	384	952
2.50	489	953	477	954	469	955	461	956	455	957	449	958	446	959	442	960
2.50	469	961	458	962	451	963	444	964	440	965	435	966	431	967	428	968
2.50	461	969	451	970	445	971	438	972	433	973	429	974	426	975	423	976
2.50	447	977	438	978	432	979	426	980	422	981	418	982	415	983	412	984
2.50	437	985	428	986	423	987	418	988	414	989	410	990	407	991	405	992
2.50	427	993	419	994	414	995	409	996	406	997	403	998	400	999	398	1000
2.50	408	1001	402	1002	398	1003	394	1004	391	1005	388	1006	386	1007	385	1008
2.75	490	1009	477	1010	469	1011	461	1012	455	1013	450	1014	446	1015	442	1016
2.75	469	1017	459	1018	452	1019	444	1020	440	1021	435	1022	431	1023	428	1024
2.75	462	1025	451	1026	445	1027	438	1028	434	1029	429	1030	426	1031	423	1032
2.75	447	1033	438	1034	432	1035	426	1036	422	1037	418	1038	415	1039	413	1040
2.75	437	1041	429	1042	423	1043	418	1044	414	1045	410	1046	408	1047	405	1048
2.75	427	1049	419	1050	414	1051	409	1052	406	1053	403	1054	400	1055	398	1056
2.75	408	1057	402	1058	398	1059	394	1060	391	1061	388	1062	386	1063	385	1064
3.00	490	1065	477	1066	469	1067	461	1068	455	1069	450	1070	446	1071	442	1072
3.00	470	1073	459	1074	452	1075	445	1076	440	1077	435	1078	432	1079	429	1080
3.00	462	1081	451	1082	445	1083	438	1084	434	1085	429	1086	426	1087	423	1088
3.00	447	1089	438	1090	432	1091	426	1092	422	1093	418	1094	415	1095	413	1096
3.00	437	1097	429	1098	423	1099	418	1100	414	1101	410	1102	408	1103	405	1104
3.00	427	1105	419	1106	415	1107	410	1108	406	1109	403	1110	400	1111	398	1112
3.00	409	1113	402	1114	398	1115	394	1116	392	1117	389	1118	387	1119	385	1120

IDENTIFICATION OF PORTLAND CEMENT ASSOCIATION MIXES

W/C Ratio	J for Fine Sand *	J for Medium Sand **	J for Coarse Sand ***
0.44	1 - 4	29 - 32	57 - 60
0.49	5 - 8	33 - 36	61 - 64
0.53	9 - 12	37 - 40	65 - 68
0.58	13 - 16	41 - 44	69 - 72
0.62	17 - 20	45 - 48	73 - 76
0.66	21 - 24	49 - 52	74 - 80
0.71	23 - 28	53 - 56	81 - 84

* Sand of fineness modulus 2.2 to 2.6.

** Sand of fineness modulus 2.6 to 2.9.

*** Sand of fineness modulus 2.9 to 3.2.

In each set of 4 mixes the maximum size of stone is 3/4", 1", 1½", and 2" in turn.

ONE POCKET MIXES PCA

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
42	170	230	536	66	103	136	353	1517	186	137	292	386	63	319	425	431	1
42	150	255	551	66	97	151	362	1522	182	133	268	417	43	311	386	391	2
42	150	300	586	66	91	178	382	1532	172	126	238	464	18	294	333	339	3
42	150	335	621	66	91	198	403	1540	163	120	226	492	5	279	309	314	4
46	135	250	585	72	118	148	387	1513	187	125	306	383	65	320	438	444	5
46	180	285	605	72	109	169	398	1519	181	121	274	424	39	311	387	393	6
46	175	320	635	72	106	189	416	1527	174	116	255	455	22	297	354	359	7
46	175	370	685	72	106	219	445	1537	162	108	238	491	6	278	321	326	8
50	225	275	644	79	136	163	425	1511	185	113	320	382	65	317	450	456	9
50	205	305	654	79	124	180	432	1515	183	112	288	418	42	313	402	408	10
50	200	355	699	79	121	210	458	1525	172	105	265	458	21	294	360	366	11
50	200	400	744	79	121	237	485	1534	163	99	250	488	7	278	333	339	12
54	245	288	681	85	148	170	452	1505	189	107	328	377	69	323	460	466	13
54	230	330	708	85	139	195	468	1512	182	103	298	417	43	312	411	417	14
54	225	380	753	85	136	225	495	1522	173	97	276	454	23	295	372	378	15
54	225	430	803	85	136	254	524	1532	163	92	260	485	8	279	344	349	16
58	290	315	747	92	170	186	496	1506	185	97	342	376	70	317	471	477	17
58	255	355	762	92	155	210	505	1510	182	95	306	416	43	312	418	424	18
58	250	410	812	92	152	243	534	1520	172	90	284	454	23	295	379	384	19
58	250	455	867	92	152	275	567	1530	162	85	267	485	8	278	350	355	20
62	300	330	786	99	182	195	524	1501	188	92	347	373	72	322	476	482	21
62	285	380	821	99	173	225	544	1509	181	89	317	413	45	310	429	434	22
62	275	430	861	99	167	254	568	1517	174	85	294	448	26	297	390	396	23
62	275	495	926	99	167	293	606	1528	163	79	275	483	9	278	357	363	24
67	330	345	836	105	200	204	557	1499	189	86	359	366	77	323	489	495	25
67	315	400	876	105	191	237	581	1507	181	83	329	407	48	310	441	446	26
67	305	455	921	105	185	269	607	1516	173	79	304	443	28	296	401	407	27
67	310	525	996	105	188	311	652	1527	161	74	288	477	12	276	371	377	28
42	190	220	536	66	109	130	353	1517	186	136	309	369	75	318	450	456	29
42	155	250	551	66	100	148	362	1522	182	133	276	409	48	311	398	403	30
42	160	290	586	66	97	172	382	1531	172	126	254	445	25	294	356	361	31
42	160	325	621	66	97	192	403	1539	163	120	241	477	12	279	330	335	32
46	205	240	585	72	124	142	387	1512	187	125	321	367	76	320	461	467	33
46	190	275	605	72	115	163	398	1518	181	121	289	409	48	311	409	414	34
46	185	315	640	72	112	186	419	1527	172	115	268	445	27	295	370	376	35
46	195	360	685	72	112	213	446	1537	162	108	252	478	11	278	339	345	36
50	235	265	644	79	142	157	426	1511	185	113	334	368	75	317	470	476	37
50	215	295	654	79	130	175	432	1514	183	112	302	404	50	312	422	427	38
50	210	345	699	79	127	204	458	1525	172	105	278	445	27	294	378	384	39
50	210	390	744	79	127	231	485	1534	162	99	262	476	12	278	350	355	40
54	255	280	683	85	155	166	454	1505	188	106	341	365	77	322	477	483	41
54	240	320	708	85	145	189	468	1512	182	103	311	404	50	312	429	434	42
54	235	370	753	85	142	219	495	1522	173	97	288	442	29	295	388	394	43
54	235	415	798	85	142	246	522	1530	164	92	273	471	15	280	362	367	44
58	290	305	747	92	176	180	496	1505	185	97	354	364	79	317	487	493	45
58	270	340	762	92	164	201	505	1510	182	95	324	398	54	312	443	449	46
58	265	395	812	92	161	234	534	1520	172	90	301	437	31	295	402	407	47
58	265	450	867	92	161	266	567	1530	162	85	283	470	15	278	371	376	48
62	315	315	786	99	191	186	524	1501	188	92	364	356	85	322	500	506	49
62	300	365	821	99	182	216	545	1509	181	89	334	397	55	310	451	457	50

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ONE POCKET MIXES PCA

W	S	L	TCT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
62	290	415	861	99	176	246	568	1517	173	85	309	432	34	297	411	417	51
62	290	480	926	99	176	284	607	1528	162	79	290	468	16	278	377	382	52
67	345	330	836	105	209	195	558	1498	188	86	375	350	89	323	511	517	53
67	330	385	876	105	200	228	581	1507	181	83	344	392	58	310	462	468	54
67	320	440	921	105	194	260	608	1515	173	79	319	428	36	296	421	427	55
67	325	510	996	105	197	302	652	1527	161	74	302	463	18	276	389	395	56
42	185	210	531	66	112	124	350	1515	188	138	320	355	96	321	468	474	57
42	175	240	551	66	106	142	362	1521	181	133	293	392	58	311	422	428	58
42	170	230	586	66	103	166	383	1531	172	126	269	433	34	294	378	383	59
42	170	315	621	66	103	186	403	1539	163	120	255	462	19	279	351	356	60
46	215	230	585	72	130	136	387	1512	187	125	337	352	88	320	483	489	61
46	200	265	605	72	121	157	398	1518	181	121	304	394	57	310	430	436	62
46	195	305	640	72	118	180	419	1527	172	115	282	431	35	295	390	396	63
46	195	350	685	72	118	207	446	1536	162	108	265	465	18	278	358	363	64
50	245	255	644	79	148	151	426	1510	185	113	348	354	86	316	490	496	65
50	225	285	654	79	136	169	432	1514	182	112	316	390	59	312	441	447	66
50	225	335	704	79	136	198	462	1525	171	104	295	429	36	292	402	408	67
50	220	380	744	79	133	225	485	1533	162	99	275	463	18	278	367	372	68
54	235	255	678	85	161	157	451	1504	189	107	356	348	91	324	500	506	69
54	250	310	708	85	152	183	469	1511	182	103	323	391	59	312	446	452	70
54	250	355	753	85	152	210	495	1521	172	97	306	424	39	295	413	419	71
54	250	405	803	85	152	240	525	1531	163	92	289	457	21	279	382	387	72
58	300	230	742	92	182	172	494	1504	186	98	368	348	91	319	508	514	73
58	280	330	762	92	170	195	505	1509	182	95	336	387	62	312	459	465	74
58	270	335	807	92	164	228	532	1519	173	91	308	429	36	296	412	418	75
58	290	435	867	92	170	257	567	1529	162	85	299	454	23	278	392	397	76
62	330	300	786	99	200	178	524	1500	188	92	382	339	99	322	524	530	77
62	310	355	821	99	188	210	545	1508	181	88	345	386	63	310	466	472	78
62	305	400	861	99	185	237	568	1516	173	85	325	416	43	297	433	439	79
62	305	455	926	99	185	275	607	1527	162	79	305	453	23	278	396	402	80
67	360	315	836	105	218	186	558	1498	188	86	391	334	103	323	533	539	81
67	345	370	876	105	209	219	581	1506	181	83	360	377	69	310	483	489	82
67	335	425	921	105	203	251	608	1515	173	79	334	414	45	296	441	447	83
67	340	430	991	105	206	290	649	1526	162	74	317	447	26	277	410	415	84

IDENTIFICATION OF POPOVICS' MIXES

Workability	Fineness Modulus of Sand	J for Fineness Modulus of Combined Aggregate *						
		3.5	4.0	4.5	5.0	5.5	6.0	6.5
Stiff	2.00	1 - 11	12 - 22	23 - 33	34 - 44	45 - 55	56 - 66	67 - 77
	2.75	78 - 88	89 - 99	100 - 110	111 - 121	122 - 132	133 - 143	144 - 154
Plastic	2.00	155 - 165	166 - 176	177 - 187	188 - 198	199 - 209	210 - 220	221 - 231
	2.75	232 - 242	243 - 253	254 - 264	265 - 275	276 - 286	287 - 297	298 - 308

* The maximum size of stone is taken at $1\frac{1}{2}$ inches and the percentage of sand chosen to give these values of the fineness modulus of combined aggregate

In each set of eleven mixes, the aggregate/cement ratio varies from 2 to 12 in turn.

ANALYSIS OF THE POPOVICS EQUATIONS

FM	A/C	CS	CP	WS	WP	SAND F	SAND M	A	SF	SM	LF	LM	J
3.5	2	11.18	10.78	46	56	0.6840	0.8125	188	129	153	59	35	1
3.5	3	8.60	8.29	55	69	0.6840	0.8125	282	193	229	89	53	2
3.5	4	6.99	6.74	65	81	0.6840	0.8125	376	257	306	119	71	3
3.5	5	5.89	5.68	75	93	0.6840	0.8125	470	321	382	149	88	4
3.5	6	5.09	4.90	84	105	0.6840	0.8125	564	386	458	178	106	5
3.5	7	4.48	4.32	94	117	0.6840	0.8125	658	450	535	208	123	6
3.5	8	4.00	3.85	104	129	0.6840	0.8125	752	514	611	238	141	7
3.5	9	3.61	3.48	113	141	0.6840	0.8125	846	579	687	267	159	8
3.5	10	3.29	3.17	123	154	0.6840	0.8125	940	643	764	297	176	9
3.5	11	3.03	2.92	133	166	0.6840	0.8125	1034	707	840	327	194	10
3.5	12	2.80	2.70	142	178	0.6840	0.8125	1128	772	917	356	212	11
3.5	2	11.18	10.78	46	56	0.5788	0.6875	188	109	129	79	59	12
3.5	3	8.60	8.29	55	69	0.5788	0.6875	282	163	194	119	88	13
3.5	4	6.99	6.74	65	81	0.5788	0.6875	376	218	259	158	118	14
3.5	5	5.89	5.68	75	93	0.5788	0.6875	470	272	323	198	147	15
3.5	6	5.09	4.90	84	105	0.5788	0.6875	564	326	388	238	176	16
3.5	7	4.48	4.32	94	117	0.5788	0.6875	658	381	452	277	206	17
3.5	8	4.00	3.85	104	129	0.5788	0.6875	752	435	517	317	235	18
3.5	9	3.61	3.48	113	141	0.5788	0.6875	846	490	582	356	264	19
3.5	10	3.29	3.17	123	154	0.5788	0.6875	940	544	646	396	294	20
3.5	11	3.03	2.92	133	166	0.5788	0.6875	1034	598	711	436	323	21
3.5	12	2.80	2.70	142	178	0.5788	0.6875	1128	653	776	475	353	22
3.5	2	11.18	10.78	46	56	0.4736	0.5625	188	89	106	99	82	23
3.5	3	8.60	8.29	55	69	0.4736	0.5625	282	134	159	148	123	24
3.5	4	6.99	6.74	65	81	0.4736	0.5625	376	178	212	198	165	25
3.5	5	5.89	5.68	75	93	0.4736	0.5625	470	223	264	247	206	26
3.5	6	5.09	4.90	84	105	0.4736	0.5625	564	267	317	297	247	27
3.5	7	4.48	4.32	94	117	0.4736	0.5625	658	312	370	346	288	28
3.5	8	4.00	3.85	104	129	0.4736	0.5625	752	356	423	396	329	29
3.5	9	3.61	3.48	113	141	0.4736	0.5625	846	401	476	445	370	30
3.5	10	3.29	3.17	123	154	0.4736	0.5625	940	445	529	495	411	31
3.5	11	3.03	2.92	133	166	0.4736	0.5625	1034	490	582	544	452	32
3.5	12	2.80	2.70	142	178	0.4736	0.5625	1128	534	635	594	494	33
3.5	2	11.18	10.78	46	56	0.3684	0.4375	188	69	82	119	106	34
3.5	3	8.60	8.29	55	69	0.3684	0.4375	282	104	123	178	159	35
3.5	4	6.99	6.74	65	81	0.3684	0.4375	376	139	165	237	212	36
3.5	5	5.89	5.68	75	93	0.3684	0.4375	470	173	206	297	264	37
3.5	6	5.09	4.90	84	105	0.3684	0.4375	564	208	247	356	317	38
3.5	7	4.48	4.32	94	117	0.3684	0.4375	658	242	288	416	370	39
3.5	8	4.00	3.85	104	129	0.3684	0.4375	752	277	329	475	423	40
3.5	9	3.61	3.48	113	141	0.3684	0.4375	846	312	370	534	476	41
3.5	10	3.29	3.17	123	154	0.3684	0.4375	940	346	411	594	529	42
3.5	11	3.03	2.92	133	166	0.3684	0.4375	1034	381	452	653	582	43
3.5	12	2.80	2.70	142	178	0.3684	0.4375	1128	416	494	712	635	44
3.5	2	11.18	10.78	46	56	0.2632	0.3125	188	49	59	139	129	45
3.5	3	8.60	8.29	55	69	0.2632	0.3125	282	74	88	208	194	46
3.5	4	6.99	6.74	65	81	0.2632	0.3125	376	99	118	277	259	47
3.5	5	5.89	5.68	75	93	0.2632	0.3125	470	124	147	346	323	48
3.5	6	5.09	4.90	84	105	0.2632	0.3125	564	148	176	416	388	49
3.5	7	4.48	4.32	94	117	0.2632	0.3125	658	173	206	485	452	50

ANALYSIS OF THE POPOVICS EQUATIONS

FM	A/C	CS	CP	WS	WP	SAND F	SAND M	A	SF	SM	LF	LM	J
3.5	8	4.00	3.85	104	129	0.2632	0.3125	752	198	235	554	517	51
3.5	9	3.61	3.48	113	141	0.2632	0.3125	846	223	264	623	582	52
3.5	10	3.29	3.17	123	154	0.2632	0.3125	940	247	294	693	646	53
3.5	11	3.03	2.92	133	166	0.2632	0.3125	1034	272	323	762	711	54
3.5	12	2.80	2.70	142	178	0.2632	0.3125	1128	297	353	831	776	55
3.5	2	11.18	10.78	46	56	0.1580	0.1875	188	30	35	158	153	56
3.5	3	8.60	8.29	55	69	0.1580	0.1875	282	45	53	237	229	57
3.5	4	6.99	6.74	65	81	0.1580	0.1875	376	59	71	317	306	58
3.5	5	5.89	5.68	75	93	0.1580	0.1875	470	74	88	395	382	59
3.5	6	5.09	4.90	84	105	0.1580	0.1875	564	89	106	475	458	60
3.5	7	4.48	4.32	94	117	0.1580	0.1875	658	104	123	554	535	61
3.5	8	4.00	3.85	104	129	0.1580	0.1875	752	119	141	633	611	62
3.5	9	3.61	3.48	113	141	0.1580	0.1875	846	134	159	712	687	63
3.5	10	3.29	3.17	123	154	0.1580	0.1875	940	149	176	791	764	64
3.5	11	3.03	2.92	133	166	0.1580	0.1875	1034	163	194	871	840	65
3.5	12	2.80	2.70	142	178	0.1580	0.1875	1128	178	212	950	917	66
3.5	2	11.18	10.78	46	56	0.0528	0.0625	188	10	12	178	176	67
3.5	3	8.60	8.29	55	69	0.0528	0.0625	282	15	18	267	264	68
3.5	4	6.99	6.74	65	81	0.0528	0.0625	376	20	24	356	353	69
3.5	5	5.89	5.68	75	93	0.0528	0.0625	470	25	29	445	441	70
3.5	6	5.09	4.90	84	105	0.0528	0.0625	564	30	35	534	529	71
3.5	7	4.48	4.32	94	117	0.0528	0.0625	658	35	41	623	617	72
3.5	8	4.00	3.85	104	129	0.0528	0.0625	752	40	47	712	705	73
3.5	9	3.61	3.48	113	141	0.0528	0.0625	846	45	53	801	793	74
3.5	10	3.29	3.17	123	154	0.0528	0.0625	940	50	59	890	881	75
3.5	11	3.03	2.92	133	166	0.0528	0.0625	1034	55	65	979	969	76
3.5	12	2.80	2.70	142	178	0.0528	0.0625	1128	60	71	1068	1058	77

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ONE POCKET MIXES POPOVICS

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
46	129	59	328	72	78	35	233	1405	308	207	334	151	475	527	684	689	1
46	153	35	328	72	93	21	233	1403	307	207	397	89	940	526	812	816	78
56	129	59	338	89	78	35	250	1352	356	193	311	140	525	609	684	689	155
56	153	35	338	89	93	21	251	1350	355	192	369	83	1025	608	812	816	232
55	193	89	431	87	117	53	305	1414	286	158	383	173	388	489	684	689	2
55	229	53	431	87	139	31	305	1412	285	158	455	102	794	488	813	816	79
69	193	89	445	106	117	53	325	1364	332	148	359	162	429	568	684	689	156
69	229	53	445	106	139	31	327	1361	331	148	425	96	863	567	813	816	233
65	257	119	535	102	156	70	377	1420	272	128	414	187	345	465	684	689	3
65	306	71	535	102	185	42	377	1417	271	128	491	111	721	464	813	816	80
81	257	119	551	127	156	70	402	1371	317	120	388	175	381	543	684	689	157
81	306	71	551	127	185	42	402	1369	316	120	460	104	782	542	813	816	234
75	321	149	639	118	195	88	449	1424	262	107	434	196	319	449	684	689	4
75	382	88	639	118	231	52	449	1421	262	107	515	116	677	448	813	816	81
93	321	149	657	146	195	88	477	1376	307	101	408	184	352	525	684	689	158
93	382	88	657	146	231	52	478	1373	306	101	484	109	734	524	813	816	235
84	386	178	742	133	234	105	520	1426	255	93	449	203	301	437	684	689	5
84	458	106	742	133	278	63	521	1424	255	92	533	120	648	436	812	816	82
105	386	178	763	166	234	105	553	1380	299	87	423	191	333	513	684	689	159
105	458	106	763	166	278	63	554	1377	299	87	501	113	702	512	812	816	236
94	450	208	846	148	273	123	592	1429	250	81	461	208	289	428	684	689	6
94	535	123	846	148	324	73	593	1426	250	81	546	123	627	427	812	816	83
117	450	208	869	185	273	123	629	1382	294	77	434	196	319	503	684	689	160
117	535	123	869	185	324	73	630	1380	293	77	514	116	679	502	812	816	237
104	514	238	950	163	312	141	664	1430	246	73	470	212	280	421	684	689	7
104	611	141	950	163	370	83	665	1427	246	72	557	125	612	420	812	816	84
129	514	238	975	204	312	141	704	1384	289	68	443	200	309	495	684	689	161
129	611	141	975	204	370	83	706	1382	289	68	525	118	661	495	812	816	238
113	579	267	1053	179	351	158	736	1432	243	66	477	215	273	416	684	689	8
113	697	159	1053	179	417	94	737	1428	242	65	565	127	600	415	813	816	85
141	579	267	1081	223	351	158	780	1386	286	62	450	203	301	489	684	689	162
141	697	159	1081	223	417	94	782	1383	285	62	533	120	648	488	813	816	239
123	643	297	1157	194	390	176	808	1433	240	60	483	218	267	411	684	689	9
123	764	176	1157	194	463	104	809	1430	240	60	572	129	590	410	813	816	86
154	643	297	1188	242	390	176	856	1388	283	56	455	205	295	484	684	689	163
154	764	176	1188	242	463	104	858	1385	282	56	540	122	637	483	813	816	240
133	707	327	1261	209	429	193	879	1434	238	55	487	220	262	407	684	689	10
133	840	194	1261	209	509	115	881	1430	237	55	578	130	582	406	813	816	87
166	707	327	1294	261	429	193	931	1389	280	52	460	208	290	480	684	689	164
166	840	194	1294	261	509	115	933	1386	280	52	546	123	628	479	813	816	241
142	772	356	1364	225	468	211	951	1434	236	51	492	222	258	404	684	689	11
142	917	212	1364	225	555	125	953	1431	236	51	583	131	575	403	813	816	88
178	772	356	1400	280	468	211	1007	1390	278	48	464	209	285	477	684	689	165
178	917	212	1400	280	555	125	1009	1387	278	48	550	124	621	476	813	816	242
39	109	79	321	62	66	47	223	1442	277	216	296	210	283	475	579	585	12
39	129	59	321	62	78	35	223	1440	277	216	351	156	453	474	688	693	89
46	109	79	330	76	66	47	237	1392	322	203	278	197	315	551	579	585	166
48	129	59	330	76	78	35	238	1390	322	203	330	146	496	550	688	693	243
47	163	119	423	74	99	70	291	1451	254	165	339	241	221	435	579	585	13
47	194	88	423	74	118	52	292	1449	254	165	403	179	369	434	688	693	90

ONE POCKET MIXES POPOVICS

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
58	163	119	434	92	99	70	309	1404	297	156	320	227	247	508	579	585	167
58	194	88	434	92	118	52	310	1402	296	156	380	168	404	508	688	693	244
55	218	158	525	86	132	94	360	1457	240	134	366	260	190	410	579	585	14
55	259	118	525	86	157	70	361	1455	239	134	434	193	327	410	688	693	91
68	218	158	538	107	132	94	381	1412	281	127	346	246	213	481	579	585	168
68	259	118	538	107	157	70	382	1410	281	126	411	182	358	481	688	693	245
62	272	198	626	99	165	117	429	1461	230	112	385	273	171	394	579	585	15
62	323	147	626	99	196	87	430	1459	229	112	456	202	302	393	688	693	92
78	272	198	642	122	165	117	453	1417	271	106	364	259	192	463	579	585	169
78	323	147	642	122	196	87	453	1415	270	106	432	192	330	462	688	693	246
70	326	238	728	111	198	141	497	1464	223	97	398	283	159	381	579	585	16
70	388	176	728	111	235	104	498	1461	222	97	472	209	286	381	687	693	93
87	326	238	745	138	198	141	524	1421	263	92	377	268	179	450	579	585	170
87	388	176	745	138	235	104	525	1419	262	92	447	199	312	449	687	693	247
78	381	277	830	123	231	164	566	1466	217	85	408	290	150	372	579	585	17
78	452	206	830	123	274	122	567	1464	217	85	483	215	274	372	687	693	94
97	381	277	849	153	231	164	595	1424	257	81	387	275	169	440	579	585	171
97	452	206	849	153	274	122	597	1422	256	81	459	204	299	439	687	693	248
86	435	317	932	135	264	187	635	1468	213	76	416	295	144	365	579	585	18
86	517	235	932	135	313	139	635	1465	213	76	493	219	265	364	687	693	95
107	435	317	953	168	264	187	668	1427	252	72	395	281	162	432	579	585	172
107	517	235	953	168	313	139	669	1424	252	72	468	208	289	431	687	693	249
94	490	356	1034	148	297	211	703	1469	210	69	422	300	138	359	579	585	19
94	582	264	1034	148	353	156	705	1467	209	68	500	222	258	359	688	693	96
117	490	356	1057	184	297	211	740	1428	249	65	401	285	156	426	579	585	173
117	582	264	1057	184	353	156	741	1426	248	65	476	211	281	425	688	693	250
101	544	396	1135	160	330	234	772	1470	207	62	427	303	134	355	579	585	20
101	646	294	1135	160	392	174	774	1468	207	62	506	225	252	354	688	693	97
126	544	396	1160	199	330	234	811	1430	245	59	406	289	151	420	579	585	174
126	646	294	1160	199	392	174	813	1427	245	59	482	214	275	420	688	693	251
109	598	436	1237	172	363	258	841	1471	205	57	431	306	131	351	579	585	21
109	711	323	1237	172	431	191	842	1469	204	57	511	227	248	350	688	693	98
136	598	436	1264	215	363	258	883	1431	243	55	411	292	148	416	579	585	175
136	711	323	1264	215	431	191	885	1429	242	54	487	216	270	415	688	693	252
117	653	475	1339	184	396	281	909	1472	203	53	435	309	128	347	579	585	22
117	776	353	1339	184	470	209	911	1469	202	53	516	229	244	347	688	693	99
146	653	475	1368	230	396	281	955	1432	241	50	414	294	145	412	579	585	176
146	776	353	1368	230	470	209	957	1430	240	50	491	218	266	411	688	693	253
35	89	99	317	55	54	59	215	1471	253	224	251	272	173	434	474	480	23
35	106	82	317	55	64	49	216	1469	253	224	297	226	250	433	563	568	100
43	89	99	325	67	54	59	228	1424	295	211	237	257	195	506	474	480	177
43	106	82	325	67	64	49	228	1422	295	211	281	213	277	505	563	568	254
41	134	148	417	65	81	88	282	1481	230	171	287	312	125	393	474	480	24
41	159	123	417	65	96	73	282	1479	229	171	341	259	192	393	563	568	101
51	134	148	427	80	81	88	297	1437	269	162	273	296	143	461	474	480	178
51	159	123	427	80	96	73	297	1435	269	162	323	245	214	461	563	568	255
47	178	198	517	75	108	117	348	1487	215	138	310	336	101	368	474	480	25
47	212	165	517	75	128	97	349	1485	215	138	368	279	163	367	563	568	102
59	178	198	529	93	108	117	365	1445	253	132	295	320	117	434	474	480	179
59	212	165	529	93	128	97	365	1443	253	132	350	266	182	433	563	568	256

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ONE POCKET MIXES POPOVICS

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
54	223	247	618	85	135	146	414	1491	205	116	326	353	87	351	474	480	26
54	264	206	618	85	160	122	415	1489	205	116	386	293	146	350	563	568	103
67	223	247	631	105	135	146	435	1451	242	111	310	337	101	415	474	480	180
67	264	206	631	105	160	122	435	1449	242	111	368	279	163	414	563	568	257
60	267	297	718	95	162	176	481	1494	198	100	337	365	77	338	474	480	27
60	317	247	718	95	192	146	482	1492	197	100	399	303	134	338	562	568	104
75	267	297	733	118	162	176	504	1455	234	96	321	349	91	401	474	480	181
75	317	247	733	118	192	146	504	1453	234	96	381	289	151	400	562	568	258
67	312	346	819	105	189	205	547	1496	192	88	345	375	70	329	474	480	28
67	370	288	819	105	224	170	548	1494	192	88	409	311	126	329	562	568	105
83	312	346	835	131	189	205	573	1458	228	84	330	358	83	390	474	480	182
83	370	288	835	131	224	170	573	1456	228	84	391	297	141	390	562	568	259
73	356	396	919	115	216	234	614	1498	188	79	352	382	65	322	474	480	29
73	423	329	919	115	256	195	615	1496	188	78	417	317	120	321	562	568	106
91	356	396	937	143	216	234	642	1460	223	75	336	365	77	382	474	480	183
91	423	329	937	143	256	195	642	1458	223	75	399	303	135	382	562	568	260
80	401	445	1020	125	243	264	680	1499	184	71	357	388	61	316	474	480	30
80	476	370	1020	125	288	219	681	1497	184	71	424	322	115	315	563	568	107
99	401	445	1039	156	243	264	710	1462	219	68	342	371	73	376	474	480	184
99	476	370	1039	156	288	219	711	1460	219	68	405	308	129	375	563	568	261
86	445	495	1120	136	270	293	746	1501	182	65	362	392	58	311	474	480	31
86	529	411	1120	136	320.	243	748	1498	181	64	429	326	111	310	563	568	108
107	445	495	1141	166	270	293	779	1464	216	62	346	376	70	370	474	480	185
107	529	411	1141	168	320	243	781	1462	216	62	411	312	125	370	563	568	262
92	490	544	1220	146	297	322	813	1502	179	59	365	396	55	307	474	480	32
92	582	452	1220	146	353	268	814	1499	179	59	433	329	108	306	563	568	109
115	490	544	1243	181	297	322	848	1465	214	57	350	380	67	366	474	480	186
115	592	452	1243	181	353	268	850	1463	213	57	415	315	122	365	563	568	263
99	534	594	1321	156	324	351	879	1502	177	55	368	400	53	303	474	480	33
99	635	494	1321	156	385	292	881	1500	177	55	437	332	106	303	563	568	110
123	534	594	1345	194	324	351	917	1466	211	53	353	383	64	362	474	480	187
123	635	494	1345	194	385	292	919	1464	211	52	419	318	119	361	563	568	264
32	69	119	314	50	42	70	210	1492	237	229	200	334	103	405	368	374	34
32	82	106	314	50	50	63	210	1491	236	229	237	297	141	405	438	443	111
39	69	119	321	61	42	70	222	1447	277	217	189	317	120	474	368	374	188
39	82	106	321	61	50	63	222	1446	276	217	225	282	160	473	438	443	265
37	104	178	413	58	63	105	275	1502	212	175	229	383	64	364	368	374	35
37	123	159	413	58	75	94	275	1501	212	175	272	341	97	363	438	443	112
46	104	178	422	72	63	105	289	1461	250	167	218	365	77	428	368	374	189
46	123	159	422	72	75	94	289	1459	250	167	259	325	112	427	438	443	266
43	139	237	513	67	84	141	340	1509	197	142	247	414	45	338	368	374	36
43	165	212	513	67	100	125	340	1507	197	142	293	368	75	338	438	443	113
53	139	237	523	83	84	141	356	1469	233	136	236	395	56	399	368	374	190
53	165	212	523	83	100	125	355	1468	233	135	280	352	88	399	438	443	267
48	173	297	612	76	105	176	405	1513	187	119	259	434	33	321	368	374	37
48	206	264	612	76	125	156	405	1511	187	119	308	386	62	320	438	443	114
59	173	297	623	94	105	176	423	1475	222	114	248	416	43	380	368	374	191
59	206	264	623	94	125	156	423	1474	222	114	295	370	74	380	.438	443	268
54	208	356	712	84	126	211	469	1516	180	103	268	449	25	308	368	374	38
54	247	317	712	84	150	188	470	1514	180	103	318	400	53	308	437	443	115

ONE POCKET MIXES POPOVICS

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
66	208	356	724	105	126	211	490	1480	214	98	257	431	35	366	368	374	192
66	247	317	724	105	150	188	490	1478	213	98	305	383	64	365	437	443	269
59	242	416	811	93	147	246	534	1518	174	90	275	460	20	298	368	374	39
59	288	370	811	93	174	219	535	1517	174	90	326	410	47	298	437	443	116
73	242	416	825	115	147	246	555	1483	207	87	264	442	29	355	368	374	193
73	288	370	825	115	174	219	557	1481	207	87	313	393	58	355	437	443	270
65	277	475	911	102	168	281	599	1520	170	80	280	469	15	291	368	374	40
65	329	423	911	102	199	250	600	1518	170	80	333	417	42	291	437	443	117
80	277	475	926	126	168	281	623	1485	203	77	269	451	24	347	368	374	194
80	329	423	926	126	199	250	624	1484	202	77	319	401	52	346	437	443	271
70	312	534	1010	110	189	316	664	1522	166	73	285	476	12	285	368	374	41
70	370	476	1010	110	224	282	665	1520	166	73	338	424	39	284	438	443	118
87	312	534	1027	137	189	316	690	1488	199	70	274	458	21	340	368	374	195
87	370	476	1027	137	224	282	691	1486	198	70	325	407	48	340	438	443	272
76	346	594	1110	119	210	351	728	1523	163	66	288	482	10	280	368	374	42
76	411	529	1110	119	249	313	729	1521	163	66	342	429	36	280	438	443	119
94	346	594	1128	148	210	351	757	1489	195	64	277	464	18	334	368	374	196
94	411	529	1128	148	249	313	758	1487	195	64	329	413	45	334	438	443	273
81	381	653	1209	128	231	386	793	1524	161	61	291	487	7	276	368	374	43
81	452	582	1209	128	274	344	794	1522	161	61	345	433	33	275	438	443	120
101	381	653	1229	159	231	386	824	1491	193	58	280	469	16	330	368	374	197
101	452	582	1229	159	274	344	825	1489	192	58	332	417	43	329	438	443	274
87	416	712	1309	136	252	422	858	1525	159	56	294	491	6	272	368	374	44
87	494	635	1309	136	299	375	859	1523	159	56	348	437	31	272	438	443	121
108	416	712	1330	170	252	422	891	1492	190	54	283	473	14	326	368	374	198
108	494	635	1330	170	299	375	892	1490	190	54	335	421	40	325	438	443	275
30	49	139	312	47	30	82	207	1506	227	233	145	396	56	388	263	268	45
30	59	129	312	47	36	76	207	1505	226	233	172	369	74	388	313	318	122
37	49	139	319	58	30	82	218	1462	265	221	138	376	69	454	263	268	199
37	59	129	319	58	36	76	218	1461	265	221	163	351	89	454	313	318	276
35	74	208	411	55	45	123	271	1516	202	178	166	454	23	346	263	268	46
35	98	194	411	55	53	115	271	1515	202	178	197	423	39	346	313	318	123
43	74	208	419	68	45	123	284	1476	238	170	159	433	33	408	263	268	200
43	98	194	419	68	53	115	284	1475	238	170	188	404	51	408	313	318	277
40	99	277	510	63	60	164	335	1523	187	144	179	490	6	320	263	268	47
40	118	259	510	63	71	153	335	1522	187	144	213	457	21	320	313	318	124
49	99	277	519	77	60	164	349	1485	221	138	172	469	16	379	263	268	201
49	118	259	519	77	71	153	350	1484	221	138	204	437	31	379	313	318	278
45	124	346	609	70	75	205	399	1527	177	121	188	514	-4	303	263	268	48
45	147	323	609	70	89	191	399	1526	177	121	223	479	-11	302	313	318	125
55	124	345	619	87	75	205	415	1491	210	116	181	493	5	359	263	268	202
55	117	323	619	87	89	191	415	1490	210	116	214	460	20	359	313	318	279
50	148	416	708	78	90	246	462	1531	169	104	195	532	-10	290	263	268	49
50	176	388	708	78	107	229	463	1529	169	104	231	496	-4	290	312	318	126
61	118	416	719	97	90	246	481	1496	202	100	187	511	-2	345	263	268	203
61	176	388	719	97	107	229	481	1495	201	100	222	477	12	345	312	318	280
55	173	485	807	86	105	287	526	1533	164	92	200	545	-15	280	263	268	50
55	206	452	807	86	125	268	527	1532	164	92	237	508	-1	280	312	318	127
68	173	485	820	107	105	287	547	1499	195	88	192	525	-8	334	263	268	204
68	206	452	820	107	125	268	547	1498	195	88	228	489	7	334	312	318	281

ONE POCKET MIXES POPOVICS

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%		T	U	SW%	SV%	J
60	198	554	906	94	120	328	590	1535	159	82	203	556	-	18	273	263	268	51
60	235	517	906	94	142	306	590	1534	159	82	241	518	-	5	272	312	318	128
74	198	554	920	116	120	328	612	1502	190	79	196	535	-	11	326	263	268	205
74	235	517	920	116	142	306	613	1501	190	79	232	499		2	325	312	318	282
65	223	623	1005	102	135	369	654	1537	156	74	206	564	-	21	267	263	268	52
65	264	582	1005	102	160	344	654	1535	156	74	245	526	-	8	266	313	318	129
80	223	623	1020	126	135	369	678	1504	186	71	199	544	-	14	319	263	268	206
80	264	582	1020	126	160	344	679	1503	186	71	236	507	-	1	318	313	318	283
70	247	693	1104	110	150	410	718	1538	153	67	209	571	-	23	262	263	268	53
70	294	646	1104	110	178	382	718	1536	153	67	248	532	-	10	261	313	318	130
86	247	693	1120	136	150	410	744	1506	183	65	202	551	-	17	313	263	268	207
86	294	646	1120	136	178	382	745	1504	183	65	239	514	-	3	313	313	318	284
74	272	762	1202	117	165	451	781	1539	150	62	211	577	-	25	257	263	268	54
74	323	711	1202	117	196	421	782	1537	150	62	250	538	-	12	257	313	318	131
92	272	762	1220	146	165	451	810	1507	180	60	204	557	-	19	308	263	268	208
92	323	711	1220	146	196	421	810	1506	180	59	242	519	-	5	308	313	318	285
79	297	831	1301	125	180	492	845	1540	148	57	213	582	-	27	254	263	268	55
79	353	776	1301	125	214	459	845	1538	148	57	253	542	-	14	254	313	318	132
99	297	831	1321	156	180	492	875	1508	178	55	206	562	-	20	304	263	268	209
99	353	776	1321	156	214	459	875	1507	178	55	244	524	-	7	304	313	318	286
29	30	158	311	46	18	94	205	1511	223	234	87	455		22	383	158	161	56
29	35	153	311	46	21	90	205	1511	223	234	104	439		30	382	188	191	133
36	30	158	318	57	18	94	217	1468	262	223	83	433		34	448	158	161	210
36	35	153	318	57	21	90	217	1468	262	222	99	417		43	448	188	191	287
34	45	237	410	54	27	140	269	1523	199	179	100	522	-	6	341	158	161	57
34	53	229	410	54	32	136	269	1522	199	179	119	503		1	340	188	191	134
42	45	237	418	66	27	140	282	1483	235	171	96	499		3	402	158	161	211
42	53	229	418	66	32	136	282	1482	235	171	114	481		10	402	188	191	288
39	59	317	509	61	36	187	333	1529	184	145	108	563	-	21	315	158	161	58
39	71	306	509	61	43	181	333	1529	184	145	128	543	-	14	314	188	191	135
48	59	317	518	76	36	187	347	1492	218	139	104	540	-	13	373	158	161	212
48	71	306	518	76	43	181	347	1491	218	139	123	521	-	6	373	188	191	289
44	74	396	608	69	45	234	396	1534	173	122	114	591	-	29	297	158	161	59
44	88	382	608	69	53	226	395	1533	173	122	135	570	-	23	297	188	191	136
54	74	396	618	85	45	234	412	1498	206	117	109	568	-	22	353	158	161	213
54	88	332	618	85	53	226	413	1498	206	117	129	548	-	16	353	188	191	290
48	89	475	706	76	54	281	459	1537	166	105	118	612	-	35	284	158	161	60
48	106	458	706	76	64	271	460	1537	166	105	139	590	-	29	284	188	191	137
60	89	475	718	94	54	281	478	1503	198	101	113	588	-	29	338	158	161	214
60	106	458	718	94	64	271	478	1502	198	101	134	567	-	22	338	188	191	291
53	104	554	805	84	63	328	523	1540	160	92	121	627	-	39	274	158	161	61
53	123	535	805	84	75	316	523	1539	160	92	143	605	-	33	274	188	191	138
66	104	554	818	104	63	328	543	1507	191	89	116	604	-	33	327	158	161	215
66	123	535	818	104	75	316	543	1506	191	89	138	582	-	27	327	188	191	292
58	119	633	904	91	72	375	586	1542	156	82	123	639	-	42	267	158	161	62
58	141	611	904	91	85	362	587	1541	156	82	146	616	-	36	267	188	191	139
72	119	633	918	113	72	375	608	1509	186	79	118	616	-	36	319	158	161	216
72	141	611	918	113	85	362	608	1508	186	79	140	594	-	30	319	188	191	293
63	134	712	1003	99	81	421	650	1544	152	74	125	649	-	45	261	158	161	63
63	159	687	1003	99	96	407	650	1543	152	74	148	626	-	39	261	188	191	140

ONE POCKET MIXES POPOVICS

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	U	SW%	SV%	J
78	134	712	1018	123	81	421	673	1511	182	72	120	626	-39	312	158	161	217
78	159	687	1018	123	96	407	674	1511	182	72	143	604	-33	312	188	191	294
68	149	791	1102	107	90	468	713	1545	149	68	126	657	-47	256	158	161	64
68	176	764	1102	107	107	452	713	1544	149	68	150	633	-41	256	188	191	141
84	149	791	1118	132	90	468	739	1513	179	65	122	634	-41	306	158	161	218
84	176	764	1118	132	107	452	739	1512	179	65	145	611	-35	306	188	191	295
72	163	871	1200	114	99	515	776	1546	147	62	128	663	-48	252	158	161	65
72	194	840	1200	114	118	497	777	1545	147	62	151	640	-43	251	188	191	142
90	163	871	1218	142	99	515	804	1515	176	60	123	641	-43	301	158	161	219
90	194	840	1218	142	118	497	804	1514	176	60	146	618	-37	301	188	191	296
77	178	950	1299	122	108	562	840	1547	145	57	129	669	-50	248	158	161	66
77	212	917	1299	122	128	542	840	1546	145	57	153	645	-44	248	188	191	143
96	178	950	1318	151	108	562	869	1516	174	55	124	647	-44	297	158	161	220
96	212	917	1318	151	128	542	870	1515	174	55	147	624	-38	297	188	191	297
30	10	178	312	47	6	105	207	1510	227	233	29	510	-2	389	53	54	67
30	12	175	312	47	7	104	207	1509	227	233	34	505	0	389	63	64	144
37	10	178	319	58	6	105	217	1466	266	222	28	485	9	455	53	54	221
37	12	175	319	58	7	104	217	1466	266	222	33	480	11	455	63	64	298
35	15	267	411	55	9	158	270	1521	203	178	33	585	-28	347	53	54	68
35	18	264	411	55	11	156	270	1521	203	178	40	579	-26	347	63	64	145
43	15	267	419	68	9	158	283	1481	239	170	32	559	-19	409	53	54	222
43	18	264	419	68	11	156	283	1481	239	170	38	553	-17	409	63	64	299
40	20	356	510	63	12	211	334	1528	188	145	36	632	-41	321	53	54	69
40	24	353	510	63	14	209	334	1528	188	144	43	625	-39	321	63	64	146
49	20	356	519	77	12	211	348	1490	222	138	35	605	-33	380	53	54	223
49	24	353	519	77	14	209	348	1490	222	138	41	599	-32	380	63	64	300
45	25	445	609	70	15	263	397	1533	177	121	38	663	-48	304	53	54	70
45	29	441	609	70	18	261	397	1533	177	121	45	656	-47	304	63	64	147
55	25	445	619	87	15	263	414	1496	211	116	36	637	-42	361	53	54	224
55	29	441	619	87	18	261	414	1496	211	116	43	630	-40	361	63	64	301
50	30	534	708	78	18	316	461	1536	170	105	39	686	-53	291	53	54	71
50	35	529	708	78	21	313	461	1536	170	105	46	679	-52	291	62	64	148
61	30	534	719	97	18	316	479	1501	202	101	38	660	-47	346	53	54	225
61	35	529	719	97	21	313	479	1501	202	101	45	653	-46	346	62	64	302
55	35	623	807	86	21	369	524	1539	164	92	40	704	-57	281	53	54	72
55	41	617	807	86	25	365	524	1539	164	92	48	696	-55	281	62	64	149
68	35	623	820	107	21	369	545	1505	196	88	39	677	-51	335	53	54	226
68	41	617	820	107	25	365	545	1504	196	88	46	670	-50	335	62	64	303
60	40	712	906	94	24	421	588	1541	160	82	41	717	-60	274	53	54	73
60	47	705	906	94	28	417	588	1541	160	82	48	710	-58	274	62	64	150
74	40	712	920	116	24	421	610	1507	191	79	39	691	-54	327	53	54	227
74	47	705	920	116	28	417	610	1507	191	79	47	684	-53	327	62	64	304
65	45	801	1005	102	27	474	651	1543	156	74	42	728	-62	268	53	54	74
65	53	793	1005	102	32	469	651	1542	156	74	49	721	-60	268	63	64	151
80	45	801	1020	126	27	474	675	1510	187	71	40	702	-57	320	53	54	228
80	53	793	1020	126	32	469	675	1509	187	71	47	694	-55	320	63	64	305
70	50	890	1104	110	30	527	715	1544	153	67	42	737	-64	263	53	54	75
70	59	881	1104	110	36	521	715	1544	153	67	50	729	-62	263	63	64	152
86	50	890	1120	136	30	527	741	1512	184	65	41	711	-58	314	53	54	229
86	59	881	1120	136	36	521	741	1511	183	65	48	703	-57	314	63	64	306

ONE POCKET MIXES . POPOVICS

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%		T	U	SW%	SV%	J
74	55	979	1202	117	33	580	778	1545	151	62	43	745	-	65	258	53	54	76
74	65	969	1202	117	39	574	778	1545	151	62	50	737	-	64	258	63	64	153
92	55	979	1220	146	33	580	807	1513	181	60	41	718	-	60	309	53	54	230
92	65	969	1220	146	39	574	807	1513	181	60	49	711	-	59	309	63	64	307
79	60	1068	1301	125	36	632	842	1546	149	57	43	751	-	66	255	53	54	77
79	71	1058	1301	125	43	626	842	1546	149	57	51	743	-	65	255	63	64	154
99	60	1068	1321	156	36	632	872	1514	178	55	41	725	-	61	305	53	54	231
99	71	1058	1321	156	43	626	872	1514	178	55	49	717	-	60	305	63	64	308

POPOVICS W/C AND A/C

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
1	48	200	78	48	200	155	60	200	232	60	200
2	59	300	79	59	300	156	73	300	233	73	300
3	69	400	80	69	400	157	86	400	234	86	400
4	79	500	81	79	500	158	99	500	235	99	500
5	90	600	82	90	600	159	112	600	236	112	600
6	100	700	83	100	700	160	125	700	237	125	700
7	110	800	84	110	800	161	138	800	238	138	800
8	121	900	85	121	900	162	150	900	239	150	900
9	131	1000	86	131	1000	163	163	1000	240	163	1000
10	141	1100	87	141	1100	164	176	1100	241	176	1100
11	151	1200	88	151	1200	165	189	1200	242	189	1200
12	42	200	89	42	200	166	52	200	243	52	200
13	50	300	90	50	300	167	62	300	244	52	300
14	58	400	91	58	400	168	72	400	245	72	400
15	66	500	92	66	500	169	83	500	246	83	500
16	75	600	93	75	600	170	93	600	247	93	600
17	83	700	94	83	700	171	103	700	248	103	700
18	91	800	95	91	800	172	114	800	249	114	800
19	100	900	96	100	900	173	124	900	250	124	900
20	108	1000	97	108	1000	174	134	1000	251	134	1000
21	116	1100	98	116	1100	175	145	1100	252	145	1100
22	124	1200	99	124	1200	176	155	1200	253	155	1200
23	37	200	100	37	200	177	45	200	254	45	200
24	44	300	101	44	300	178	54	300	255	54	300
25	50	400	102	50	400	179	63	400	256	63	400
26	57	500	103	57	500	180	71	500	257	71	500
27	64	600	104	64	600	181	80	600	258	80	600
28	71	700	105	71	700	182	88	700	259	88	700
29	78	800	106	78	800	183	97	800	260	97	800
30	85	900	107	85	900	184	105	900	261	105	900
31	91	1000	108	91	1000	185	114	1000	262	114	1000
32	98	1100	109	98	1100	186	122	1100	263	122	1100
33	105	1200	110	105	1200	187	131	1200	264	131	1200
34	34	200	111	34	200	188	41	200	265	41	200
35	39	300	112	39	300	189	49	300	266	49	300
36	45	400	113	45	400	190	56	400	267	56	400
37	51	500	114	51	500	191	63	500	268	63	500
38	57	600	115	57	600	192	71	600	269	71	600
39	63	700	116	63	700	193	78	700	270	78	700
40	69	800	117	69	800	194	85	800	271	85	800
41	74	900	118	74	900	195	92	900	272	92	900
42	80	1000	119	80	1000	196	100	1000	273	100	1000
43	86	1100	120	86	1100	197	107	1100	274	107	1100
44	92	1200	121	92	1200	198	114	1200	275	114	1200
45	32	200	122	32	200	199	39	200	276	39	200
46	37	300	123	37	300	200	46	300	277	46	300
47	42	400	124	42	400	201	52	400	278	52	400
48	48	500	125	48	500	202	59	500	279	59	500
49	53	600	126	53	600	203	65	600	280	65	600
50	58	700	127	58	700	204	72	700	281	72	700
51	63	800	128	63	800	205	79	800	282	79	800
52	69	900	129	69	900	206	85	900	283	85	900

POPOVICS W/C AND A/C

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
53	74	1000	130	74	1000	207	92	1000	284	92	1000
54	79	1100	131	79	1100	208	98	1100	285	98	1100
55	85	1200	132	85	1200	209	105	1200	286	105	1200
56	31	200	133	31	200	210	38	200	287	38	200
57	36	300	134	36	300	211	45	300	288	45	300
58	41	400	135	41	400	212	51	400	289	51	400
59	46	500	136	46	500	213	57	500	290	57	500
60	51	600	137	51	600	214	64	600	291	64	600
61	57	700	138	57	700	215	70	700	292	70	700
62	62	800	139	62	800	216	76	800	293	76	800
63	67	900	140	67	900	217	83	900	294	83	900
64	72	1000	141	72	1000	218	89	1000	295	89	1000
65	77	1100	142	77	1100	219	95	1100	296	95	1100
66	82	1200	143	82	1200	220	102	1200	297	102	1200
67	32	200	144	32	200	221	39	200	298	39	200
68	37	300	145	37	300	222	46	300	299	46	300
69	42	400	146	42	400	223	52	400	300	52	400
70	48	500	147	48	500	224	59	500	301	59	500
71	53	600	148	53	600	225	65	600	302	65	600
72	58	700	149	58	700	226	72	700	303	72	700
73	63	800	150	63	800	227	79	800	304	79	800
74	69	900	151	69	900	228	85	900	305	85	900
75	74	1000	152	74	1000	229	92	1000	306	92	1000
76	79	1100	153	79	1100	230	98	1100	307	98	1100
77	85	1200	154	85	1200	231	105	1200	308	105	1200

IDENTIFICATION OF GRANGER MIXES

% Sand	% Stone		J for Water/Cement Ratio		
	$-\frac{3}{8}+3/16$	$-\frac{3}{4}+\frac{3}{8}$	0.45	0.57	0.70
33.3	0	66.7	1 - 5	76 - 80	151 - 155
40.0	0	60.0	6 - 10	81 - 85	156 - 160
45.0	0	55.0	11 - 15	86 - 90	161 - 165
50.0	0	50.0	16 - 20	91 - 95	166 - 170
33.3	16.7	50.0	21 - 25	96 - 100	171 - 175
40.0	15.0	45.0	26 - 30	101 - 105	176 - 180
45.0	13.8	41.2	31 - 35	106 - 110	181 - 185
50.0	12.5	37.5	36 - 40	111 - 115	186 - 190
33.3	33.3	33.4	41 - 45	116 - 120	191 - 195
40.0	30.0	30.0	46 - 50	121 - 125	196 - 200
45.0	27.5	27.5	51 - 55	126 - 130	201 - 205
50.0	25.0	25.0	56 - 60	131 - 135	206 - 210
33.3	50.0	16.7	61 - 65	136 - 140	211 - 215
40.0	45.0	15.0	66 - 70	141 - 145	216 - 220
45.0	41.2	13.8	71 - 75	146 - 150	221 - 225

The sets of 5 mixes have aggregate/cement ratios of 3.62, 3.99, 4.47, 5.00 and 5.69 in turn.

ONE POCKET MIXES   GRAINGER

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	SL	CF	J
42	115	225	476	66	70	137	321	1481	206	150	217	427	43	47	98	1
42	125	250	511	66	76	152	343	1491	193	141	221	445	33	5	96	2
42	140	280	556	66	85	171	370	1503	179	130	229	461	24	5	88	3
42	155	315	606	66	94	192	400	1513	165	120	235	480	15	0	83	4
42	180	355	671	66	109	216	440	1525	151	110	248	492	10	0	78	5
42	135	205	476	66	82	125	321	1482	206	150	255	389	67	67	95	6
42	150	225	511	66	91	137	343	1492	193	141	265	401	59	25	9	7
42	170	250	556	66	103	152	370	1503	179	130	279	412	52	10	84	8
42	190	280	606	66	115	171	400	1514	165	120	288	427	43	2	9	9
42	215	320	671	66	130	195	440	1525	151	110	296	444	33	0	72	10
42	155	185	476	66	94	113	321	1482	206	150	292	351	97	70	97	11
42	170	205	511	66	103	125	342	1492	193	141	301	365	85	23	9	12
42	185	235	556	66	112	143	370	1503	179	130	303	387	68	7	90	13
42	210	260	606	66	127	159	400	1514	165	120	318	396	62	1	9	14
42	240	295	671	66	145	180	440	1526	151	110	331	409	54	0	76	15
42	170	170	476	66	103	104	321	1482	206	150	321	323	123	60	93	16
42	185	190	511	66	112	116	342	1492	193	141	327	338	108	40	9	17
42	210	210	556	66	127	128	370	1504	179	130	344	346	101	12	83	18
42	235	235	606	66	142	143	400	1514	166	120	356	358	91	0	9	19
42	265	270	671	66	161	165	440	1526	151	110	365	374	78	0	76	20
42	115	125	376	66	70	76	260	1444	254	185	268	293	171	47	93	21
42	125	250	511	66	76	152	343	1491	193	141	221	445	40	12	9	22
42	140	280	556	66	85	171	370	1503	179	130	229	461	31	7	85	23
42	155	315	606	66	94	192	400	1513	165	120	235	480	22	0	9	24
42	180	355	671	66	109	216	440	1525	151	110	248	492	16	0	9	25
42	135	205	476	66	82	125	321	1482	206	150	255	389	76	32	97	26
42	150	225	511	66	91	137	343	1492	193	141	265	401	68	15	9	27
42	170	250	556	66	103	152	370	1503	179	130	279	412	60	7	91	28
42	190	280	606	66	115	171	400	1514	165	120	288	427	51	1	9	29
42	215	320	671	66	130	195	440	1525	151	110	296	444	41	0	80	30
42	155	185	476	66	94	113	321	1482	206	150	292	351	108	40	96	31
42	170	205	511	66	103	125	342	1492	193	141	301	365	95	15	9	32
42	185	235	556	66	112	143	370	1503	179	130	303	387	78	10	85	33
42	210	260	606	66	127	159	400	1514	165	120	318	396	71	1	9	34
42	240	295	671	66	145	180	440	1526	151	110	331	409	62	0	77	35
42	170	170	476	66	103	104	321	1482	206	150	321	323	136	99	96	36
42	185	190	511	66	112	116	342	1492	193	141	327	338	120	99	9	37
42	210	210	556	66	127	128	370	1504	179	130	344	346	112	99	88	38
42	235	235	606	66	142	143	400	1514	166	120	356	358	101	99	9	39
42	265	270	671	66	161	165	440	1526	151	110	365	374	88	99	80	40
42	115	225	476	66	70	137	321	1481	206	150	217	427	53	20	96	41
42	125	250	511	66	76	152	343	1491	193	141	221	445	42	15	9	42
42	140	280	556	66	85	171	370	1503	179	130	229	461	33	10	85	43
42	155	315	606	66	94	192	400	1513	165	120	235	480	23	5	9	44
42	180	355	671	66	109	216	440	1525	151	110	248	492	17	0	77	45
42	135	205	476	66	82	125	321	1482	206	150	255	389	78	42	96	46
42	150	225	511	66	91	137	343	1492	193	141	265	401	70	17	9	47
42	170	250	556	66	103	152	370	1503	179	130	279	412	62	10	88	48
42	190	280	606	66	115	171	400	1514	165	120	288	427	53	0	9	49
42	215	320	671	66	130	195	440	1525	151	110	296	444	43	0	79	50

ONE POCKET MIXES GRAINGER

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	SL	CF	J
42	155	185	476	66	94	113	321	1482	206	150	292	351	110	50	97	51
42	170	205	511	66	103	125	342	1492	193	141	301	365	98	22	9	52
42	185	235	556	66	112	143	370	1503	179	130	303	387	80	2	87	53
42	210	260	606	66	127	159	400	1514	165	120	318	396	73	0	9	54
42	240	295	671	66	145	180	440	1526	151	110	331	409	64	0	80	55
42	170	170	476	66	103	104	321	1482	206	150	321	323	138	99	97	56
42	185	190	511	66	112	116	342	1492	193	141	327	338	122	99	9	57
42	210	210	556	66	127	128	370	1504	179	130	344	346	114	99	84	58
42	235	235	606	66	142	143	400	1514	166	120	356	358	104	99	9	59
42	265	270	671	66	161	165	440	1526	151	110	365	374	90	99	71	60
42	115	225	476	66	70	137	321	1481	206	150	217	427	53	20	90	61
42	125	250	511	66	76	152	343	1491	193	141	221	445	42	12	9	62
42	140	280	556	66	85	171	370	1503	179	130	229	461	33	5	84	63
42	155	315	606	66	94	192	400	1513	165	120	235	480	23	0	9	64
42	180	355	671	66	109	216	440	1525	151	110	248	492	17	0	77	65
42	135	205	476	66	82	125	321	1482	206	150	255	389	78	75	86	66
42	150	225	511	66	91	137	343	1492	193	141	265	401	70	65	9	67
42	170	250	556	66	103	152	370	1503	179	130	279	412	62	4	85	68
42	190	280	606	66	115	171	400	1514	165	120	288	427	53	0	9	69
42	215	320	671	66	130	195	440	1525	151	110	296	444	43	0	81	70
42	155	185	476	66	94	113	321	1482	206	150	292	351	110	40	96	71
42	170	205	511	66	103	125	342	1492	193	141	301	365	98	2	9	72
42	185	235	556	66	112	143	370	1503	179	130	303	387	80	0	91	73
42	215	260	611	66	130	159	403	1515	164	120	323	393	75	0	9	74
42	240	295	671	66	145	180	440	1526	151	110	331	409	64	0	83	75
54	125	250	523	85	76	152	362	1446	236	133	210	422	46	65	99	76
54	140	280	568	85	85	171	389	1460	219	124	218	439	36	30	9	77
54	155	315	618	85	94	192	419	1474	203	115	224	458	26	20	96	78
54	180	355	683	85	109	216	459	1488	186	105	238	472	19	10	9	79
54	210	415	773	85	127	253	514	1505	166	94	248	493	10	0	83	80
54	150	225	523	85	91	137	361	1447	236	133	252	380	74	75	99	81
54	170	250	568	85	103	152	389	1461	219	124	265	392	65	65	9	82
54	190	280	618	85	115	171	419	1474	203	115	275	407	55	37	97	83
54	215	320	683	85	130	195	459	1489	186	105	284	425	44	15	9	84
54	250	375	773	85	152	229	514	1505	166	94	295	445	33	12	85	85
54	170	205	523	85	103	125	361	1447	236	133	285	346	101	75	99	86
54	190	230	568	85	115	140	389	1461	219	124	296	361	89	70	9	87
54	210	260	618	85	127	159	419	1474	203	115	304	378	75	22	93	88
54	240	295	683	85	145	180	459	1489	186	105	317	392	65	5	9	89
54	280	345	773	85	170	210	513	1506	166	94	331	410	53	10	83	90
54	185	190	523	85	112	116	361	1447	236	133	310	321	125	45	99	91
54	210	210	568	85	127	128	389	1461	219	124	327	329	117	27	9	92
54	235	235	618	85	142	143	419	1475	203	115	340	342	105	10	97	93
54	265	270	683	85	161	165	459	1489	186	105	350	359	90	2	9	94
54	310	315	773	85	188	192	513	1506	166	94	366	374	78	0	9	95
54	125	250	523	85	76	152	362	1446	236	133	210	422	54	57	98	96
54	140	280	568	85	85	171	389	1460	219	124	218	439	44	55	96	97
54	155	315	618	85	94	192	419	1474	203	115	224	458	33	32	94	98
54	180	355	683	85	109	216	459	1488	186	105	238	472	26	15	90	99
54	210	415	773	85	127	253	514	1505	166	94	248	493	16	0	82	100

1698

ONE POCKET MIXES GRAINGER

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	SL	CF	J
54	150	225	523	85	91	137	361	1447	236	133	252	380	84	72	99	£01
54	170	250	568	85	103	152	389	1461	219	124	265	392	74	70	99	£02
54	190	280	618	85	115	171	419	1474	203	115	275	407	64	35	98	£03
54	215	320	683	85	130	195	459	1489	186	105	284	425	52	7	95	£04
54	250	375	773	85	152	229	514	1505	166	94	295	445	40	2	88	£05
54	170	205	523	85	103	125	361	1447	236	133	285	346	112	80	99	£06
54	190	230	568	85	115	140	389	1461	219	124	296	361	99	65	99	£07
54	210	260	618	85	127	159	419	1474	203	115	304	378	85	45	99	£08
54	240	295	683	85	145	180	459	1489	186	105	317	392	74	20	97	£09
54	280	345	773	85	170	210	513	1506	166	94	331	410	62	2	88	£10
54	185	190	523	85	112	116	361	1447	236	133	310	321	138	99	97	£11
54	210	210	568	85	127	128	389	1461	219	124	327	329	129	99	97	£12
54	235	235	618	85	142	143	419	1475	203	115	340	342	116	99	96	£13
54	265	270	683	85	161	165	459	1489	186	105	350	359	101	99	94	£14
54	310	315	773	85	188	192	513	1506	166	94	366	374	88	99	83	£15
54	125	250	523	85	76	152	362	1446	236	133	210	422	56	60	99	£16
54	140	280	568	85	85	171	389	1460	219	124	218	439	45	55	9	£17
54	155	315	618	85	94	192	419	1474	203	115	224	458	34	40	97	£18
54	180	355	683	85	109	216	459	1488	186	105	238	472	27	5	92	£19
54	210	415	773	85	127	253	514	1505	166	94	248	493	17	0	9	£20
54	150	225	523	85	91	137	361	1447	236	133	252	380	86	85	99	£21
54	170	250	568	85	103	152	389	1461	219	124	265	392	76	67	9	£22
54	190	280	618	85	115	171	419	1474	203	115	275	407	65	40	97	£23
54	215	320	683	85	130	195	459	1489	186	105	284	425	54	17	93	£24
54	250	375	773	85	152	229	514	1505	166	94	295	445	42	2	9	£25
54	170	205	523	85	103	125	361	1447	236	133	285	346	115	75	99	£26
54	190	230	568	85	115	140	389	1461	219	124	296	361	101	60	9	£27
54	210	260	618	85	127	159	419	1474	203	115	304	378	87	25	99	£28
54	240	295	683	85	145	180	459	1489	186	105	317	392	76	2	95	£29
54	280	345	773	85	170	210	513	1506	166	94	331	410	64	0	9	£30
54	185	190	523	85	112	116	361	1447	236	133	310	321	141	99	99	£31
54	210	210	568	85	127	128	389	1461	219	124	327	329	131	99	9	£32
54	235	235	618	85	142	143	419	1475	203	115	340	342	119	99	94	£33
54	265	270	683	85	161	165	459	1489	186	105	350	359	103	99	9	£34
54	310	315	773	85	188	192	513	1506	166	94	366	374	90	99	81	£35
54	125	250	523	85	76	152	362	1446	236	133	210	422	56	55	99	£36
54	140	280	568	85	85	171	389	1460	219	124	218	439	45	55	9	£37
54	155	315	618	85	94	192	419	1474	203	115	224	458	34	10	91	£38
54	180	355	683	85	109	216	459	1488	186	105	238	472	27	7	86	£39
54	210	415	773	85	127	253	514	1505	166	94	248	493	17	0	9	£40
54	150	225	523	85	91	137	361	1447	236	133	252	380	86	75	99	£41
54	170	250	568	85	103	152	389	1461	219	124	265	392	76	44	9	£42
54	190	280	618	85	115	171	419	1474	203	115	275	407	65	9	95	£43
54	215	320	683	85	130	195	459	1489	186	105	284	425	54	0	93	£44
54	250	375	773	85	152	229	514	1505	166	94	295	445	42	0	9	£45
54	170	205	523	85	103	125	361	1447	236	133	285	346	115	65	99	£46
54	190	230	568	85	115	140	389	1461	219	124	296	361	101	40	9	£47
54	210	260	618	85	127	159	419	1474	203	115	304	378	87	15	97	£48
54	240	295	683	85	145	180	459	1489	186	105	317	392	76	0	94	£49
54	280	345	773	85	170	210	513	1506	166	94	331	410	64	0	9	£50

ONE POCKET MIXES GRAINGER

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	SL	CF	J
66	140	280	580	104	85	171	408	1422	255	118	208	419	48	60	99	£51
66	155	315	630	104	94	192	438	1437	237	110	214	438	36	85	9	£52
66	180	355	695	104	109	216	478	1454	218	101	228	453	28	75	96	£53
66	210	415	785	104	127	253	533	1474	195	90	239	475	18	65	9	£54
66	250	500	910	104	152	305	609	1495	171	79	249	501	6	99	90	£55
66	170	250	580	104	103	152	408	1422	255	118	253	374	78	75	99	£56
66	190	280	630	104	115	171	438	1438	238	110	263	390	67	70	99	£57
66	215	320	695	104	130	195	478	1455	218	101	273	408	54	70	9	£58
66	250	375	785	104	152	229	532	1474	195	91	285	429	41	99	9	£59
66	300	450	910	104	182	274	609	1495	171	79	299	451	30	99	87	£60
66	190	230	580	104	115	140	408	1423	255	118	282	344	103	85	76	£61
66	210	260	630	104	127	159	438	1438	238	110	291	362	88	75	9	£62
66	240	295	695	104	145	180	478	1455	218	101	305	377	76	47	99	£63
66	280	345	785	104	170	210	532	1475	196	91	319	395	63	20	9	£64
66	340	410	910	104	206	250	608	1496	171	79	339	411	52	99	85	£65
66	210	210	580	104	127	128	408	1423	255	118	312	314	132	85	99	£66
66	235	235	630	104	142	143	438	1438	238	110	325	327	119	70	9	£67
66	265	270	695	104	161	165	478	1455	218	101	336	345	102	40	99	£68
66	310	315	785	104	188	192	532	1475	196	91	353	361	88	10	9	£69
66	375	375	910	104	227	229	608	1496	171	79	374	376	77	99	85	£70
66	140	280	580	104	85	171	408	1422	255	118	208	419	56	85	99	£71
66	155	315	630	104	94	192	438	1437	237	110	214	438	44	80	99	£72
66	180	355	695	104	109	216	478	1454	218	101	228	453	36	40	99	£73
66	210	415	785	104	127	253	533	1474	195	90	239	475	24	10	94	£74
66	250	500	910	104	152	305	609	1495	171	79	249	501	12	0	85	£75
66	170	250	580	104	103	152	408	1422	255	118	253	374	88	72	99	£76
66	190	280	630	104	115	171	438	1438	238	110	263	390	76	70	99	£77
66	215	320	695	104	130	195	478	1455	218	101	273	408	63	55	99	£78
66	250	375	785	104	152	229	532	1474	195	91	285	429	49	30	96	£79
66	300	450	910	104	182	274	609	1495	171	79	299	451	37	0	87	£80
66	190	230	580	104	115	140	408	1423	255	118	282	344	114	80	99	£81
66	210	260	630	104	127	159	438	1438	238	110	291	362	98	75	99	£82
66	240	295	695	104	145	180	478	1455	218	101	305	377	86	60	99	£83
66	280	345	785	104	170	210	532	1475	196	91	319	395	72	30	96	£84
66	340	410	910	104	206	250	608	1496	171	79	339	411	61	6	87	£85
66	210	210	580	104	127	128	408	1423	255	118	312	314	145	99	99	£86
66	235	235	630	104	142	143	438	1438	238	110	325	327	131	99	9	£87
66	265	270	695	104	161	165	478	1455	218	101	336	345	114	99	99	£88
66	310	315	785	104	188	192	532	1475	196	91	353	361	99	99	9	£89
66	375	375	910	104	227	229	608	1496	171	79	374	376	87	99	85	£90
66	140	280	580	104	85	171	408	1422	255	118	208	419	58	77	99	£91
66	155	315	630	104	94	192	438	1437	237	110	214	438	46	60	9	£92
66	180	355	695	104	109	216	478	1454	218	101	228	453	37	30	95	£93
66	210	415	785	104	127	253	533	1474	195	90	239	475	26	10	9	£94
66	250	500	910	104	152	305	609	1495	171	79	249	501	13	0	86	£95
66	170	250	580	104	103	152	408	1422	255	118	253	374	90	80	99	£96
66	190	280	630	104	115	171	438	1438	238	110	263	390	78	75	9	£97
66	215	320	695	104	130	195	478	1455	218	101	273	408	65	55	99	£98
66	250	375	785	104	152	229	532	1474	195	91	285	429	51	12	9	£99
66	300	450	910	104	182	274	609	1495	171	79	299	451	38	0	89	200

ONE POCKET MIXES GRAINGER

W	S	L	TOT	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	SL	CF	J
66	190	230	580	104	115	140	408	1423	255	118	282	344	117	87	99	201
66	210	260	630	104	127	159	438	1438	238	110	291	362	100	85	9	202
66	240	295	695	104	145	180	478	1455	218	101	305	377	88	57	99	203
66	280	345	785	104	170	210	532	1475	196	91	319	395	74	99	9	204
66	340	410	910	104	206	250	608	1496	171	79	339	411	63	99	86	205
66	210	210	580	104	127	128	408	1423	255	118	312	314	148	99	99	206
66	235	235	630	104	142	143	438	1438	238	110	325	327	134	99	9	207
66	265	270	695	104	161	165	478	1455	218	101	336	345	116	99	99	208
66	310	315	785	104	188	192	532	1475	196	91	353	361	101	99	9	209
66	375	375	910	104	227	229	608	1496	171	79	374	376	89	99	84	210
66	140	280	580	104	85	171	408	1422	255	118	208	419	58	70	99	211
66	155	315	630	104	94	192	438	1437	237	110	214	438	46	35	9	212
66	180	355	695	104	109	216	478	1454	218	101	228	453	37	0	96	213
66	210	415	785	104	127	253	533	1474	195	90	239	475	26	0	9	214
66	250	500	910	104	152	305	609	1495	171	79	249	501	13	0	85	215
66	170	250	580	104	103	152	408	1422	255	118	253	374	90	80	99	216
66	190	280	630	104	115	171	438	1438	238	110	263	390	78	65	9	217
66	215	320	695	104	130	195	478	1455	218	101	273	408	65	5	96	218
66	250	375	785	104	152	229	532	1474	195	91	285	429	51	0	9	219
66	300	450	910	104	182	274	609	1495	171	79	299	451	38	0	86	220
66	190	230	580	104	115	140	408	1423	255	118	282	344	117	85	99	221
66	210	260	630	104	127	159	438	1438	238	110	291	362	100	70	9	222
66	240	295	695	104	145	180	478	1455	218	101	305	377	88	15	98	223
66	280	345	785	104	170	210	532	1475	196	91	319	395	74	0	9	224
66	340	410	910	104	206	250	608	1496	171	79	339	411	63	0	90	225

GRANGER W/C AND A/C

J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C	J	W/C	A/C
1	45	362	2	45	399	3	45	447	4	45	500	5	45	569
6	45	362	7	45	399	8	45	447	9	45	500	10	45	569
11	45	362	12	45	399	13	45	447	14	45	500	15	45	569
16	45	362	17	45	399	18	45	447	19	45	500	20	45	569
21	45	255	22	45	399	23	45	447	24	45	500	25	45	569
26	45	362	27	45	399	28	45	447	29	45	500	30	45	569
31	45	362	32	45	399	33	45	447	34	45	500	35	45	569
36	45	362	37	45	399	38	45	447	39	45	500	40	45	569
41	45	362	42	45	399	43	45	447	44	45	500	45	45	569
46	45	362	47	45	399	48	45	447	49	45	500	50	45	569
51	45	362	52	45	399	53	45	447	54	45	500	55	45	569
56	45	362	57	45	399	58	45	447	59	45	500	60	45	569
61	45	362	62	45	399	63	45	447	64	45	500	65	45	569
66	45	362	67	45	399	68	45	447	69	45	500	70	45	569
71	45	362	72	45	399	73	45	447	74	45	505	75	45	569
76	57	399	77	57	447	78	57	500	79	57	569	80	57	665
81	57	399	82	57	447	83	57	500	84	57	569	85	57	665
86	57	399	87	57	447	88	57	500	89	57	569	90	57	665
91	57	399	92	57	447	93	57	500	94	57	569	95	57	665
96	57	399	97	57	447	98	57	500	99	57	569	100	57	665
101	57	399	102	57	447	103	57	500	104	57	569	105	57	665
106	57	399	107	57	447	108	57	500	109	57	569	110	57	665
111	57	399	112	57	447	113	57	500	114	57	569	115	57	665
116	57	399	117	57	447	118	57	500	119	57	569	120	57	665
121	57	399	122	57	447	123	57	500	124	57	569	125	57	665
126	57	399	127	57	447	128	57	500	129	57	569	130	57	665
131	57	399	132	57	447	133	57	500	134	57	569	135	57	665
136	57	399	137	57	447	138	57	500	139	57	569	140	57	665
141	57	399	142	57	447	143	57	500	144	57	569	145	57	665
146	57	399	147	57	447	148	57	500	149	57	569	150	57	665
151	70	447	152	70	500	153	70	569	154	70	665	155	70	798
156	70	447	157	70	500	158	70	569	159	70	665	160	70	798
161	70	447	162	70	500	163	70	569	164	70	665	165	70	798
166	70	447	167	70	500	168	70	569	169	70	665	170	70	798
171	70	447	172	70	500	173	70	569	174	70	665	175	70	798
176	70	447	177	70	500	178	70	569	179	70	665	180	70	798
181	70	447	182	70	500	183	70	569	184	70	665	185	70	798
186	70	447	187	70	500	188	70	569	189	70	665	190	70	798
191	70	447	192	70	500	193	70	569	194	70	665	195	70	798
196	70	447	197	70	500	198	70	569	199	70	665	200	70	798
201	70	447	202	70	500	203	70	569	204	70	665	205	70	798
206	70	447	207	70	500	208	70	569	209	70	665	210	70	798
211	70	447	212	70	500	213	70	569	214	70	665	215	70	798
216	70	447	217	70	500	218	70	569	219	70	665	220	70	798
221	70	447	222	70	500	223	70	569	224	70	665	225	70	798

GRANGER DA PER A PER ONE INCH SLUMP

P	DOWN	UP	P	DOWN	UP	P	DOWN	UP	P	DOWN	UP
1	0.025	0.022	1	9.999	9.999	1	9.999	9.999	1	9.999	9.999
2	0.025	0.022	2	0.080	0.071	2	0.149	0.133	2	9.999	9.999
3	0.022	0.020	3	0.075	0.067	3	0.198	0.177	3	9.999	9.999
4	0.051	0.047	4	0.043	0.038	4	9.999	9.999	4	9.999	9.999
5	0.161	0.103	5	0.240	0.214	5	9.999	9.999	5	9.999	9.999
6	0.061	0.055	6	0.150	0.134	6	0.198	0.177	6	9.999	9.999
7	0.041	0.037	7	0.240	0.214	7	0.132	0.118	7	9.999	9.999
8	9.999	9.999	8	9.999	9.999	8	9.999	9.999	8	9.999	9.999
9	0.206	0.187	9	0.240	0.214	9	0.238	0.213	9	9.999	9.999
10	0.041	0.037	10	0.171	0.153	10	9.999	9.999	10	9.999	9.999
11	0.037	0.033	11	0.060	0.054	11	9.999	9.999	11	9.999	9.999
12	9.999	9.999	12	9.999	9.999	12	9.999	9.999	12	9.999	9.999
13	0.129	0.117	13	0.171	0.153	13	9.999	9.999	13	9.999	9.999
14	0.103	0.093	14	0.020	0.018	14	9.999	9.999	14	9.999	9.999
15	0.027	0.025	15	9.999	9.999	15	9.599	9.999	15	9.999	9.999
16	0.034	0.031	16	0.119	0.106	16	0.138	0.121	16	9.999	9.999
17	0.120	0.107	17	0.043	0.038	17	0.063	0.055	17	0.561	0.480
18	0.240	0.214	18	0.025	0.022	18	0.081	0.071	18	-0.336	-0.288
19	0.057	0.060	19	0.070	0.063	19	0.173	0.152	19	9.999	9.999
20	0.600	0.536	20	0.052	0.046	20	0.081	0.071	20	9.999	9.999
21	0.600	0.536	21	0.034	0.030	21	0.049	0.043	21	0.336	0.288
22	0.080	0.071	22	0.060	0.053	22	0.055	0.049	22	0.093	0.080
23	9.999	9.999	23	9.999	9.999	23	9.999	9.999	23	9.999	9.999
24	0.240	0.214	24	0.079	0.071	24	0.040	0.035	24	9.999	9.999
25	0.067	0.060	25	0.044	0.039	25	0.060	0.053	25	0.112	0.096
26	0.080	0.071	26	0.034	0.030	26	0.060	0.053	26	9.999	9.999
27	9.999	9.999	27	9.999	9.999	27	9.999	9.999	27	9.999	9.999
28	9.999	9.999	28	0.026	0.024	28	0.461	0.405	28	9.999	9.999
29	0.039	0.035	29	0.034	0.030	29	9.999	9.999	29	9.999	9.999
30	0.048	0.043	30	0.048	0.043	30	9.999	9.999	30	9.999	9.999
31	-0.048	-0.043	31	0.138	0.121	31	0.168	0.144	31	9.999	9.999
32	0.238	0.213	32	9.999	9.999	32	9.999	9.999	32	9.999	9.999
33	0.119	0.106	33	0.049	0.043	33	0.062	0.053	33	9.999	9.999
34	0.079	0.071	34	0.046	0.040	34	0.056	0.048	34	9.999	9.999
35	0.238	0.213	35	0.035	0.030	35	0.056	0.048	35	9.999	9.999
36	0.595	0.532	36	0.092	0.081	36	0.067	0.058	36	9.999	9.999
37	0.236	0.213	37	0.092	0.081	37	0.056	0.048	37	0.083	0.069
38	9.999	9.999	38	9.999	9.999	38	9.999	9.999	38	9.999	9.999
39	0.070	0.063	39	0.046	0.040	39	0.084	0.072	39	9.999	9.999
40	0.239	0.213	40	0.069	0.061	40	0.039	0.033	40	9.999	9.999
41	0.595	0.532	41	0.049	0.043	41	9.999	9.999	41	9.999	9.999
42	9.999	9.999	42	9.999	9.999	42	9.999	9.999	42	9.999	9.999
43	0.034	0.030	43	9.999	9.999	43	9.999	9.999	43	9.999	9.999
44	0.079	0.071	44	0.023	0.020	44	9.999	9.999	44	9.999	9.999
45	0.079	0.071	45	0.025	0.022	45	9.999	9.999	45	9.999	9.999

WORKABILITY FUNCTION K_1 LOG A/C

K 15	16	18	20	22.5	25	40	45	50	55	60	70	A/C
78.55	83.78	94.26	104.73	117.82	130.91	209.46	235.64	261.82	288.00	314.19	366.55	2.0
79.98	85.31	95.97	106.64	119.96	133.29	213.27	239.93	266.59	293.25	319.91	373.22	2.2
81.28	86.70	97.54	108.38	121.92	135.47	216.75	243.84	270.94	298.03	325.13	379.31	2.4
82.48	87.98	98.98	109.98	123.72	137.47	219.95	247.45	274.94	302.43	329.93	384.92	2.6
83.59	89.17	100.31	111.46	125.39	139.32	222.92	250.78	278.65	306.51	334.37	390.10	2.8
84.63	90.27	101.55	112.84	126.94	141.05	225.68	253.89	282.10	310.30	338.51	394.93	3.0
85.60	91.30	102.72	114.13	128.40	142.66	228.26	256.79	285.32	313.85	342.39	399.45	3.2
86.51	92.27	103.81	115.34	129.76	144.18	230.68	259.52	288.35	317.19	346.02	403.69	3.4
87.36	93.19	104.84	116.48	131.05	145.61	232.97	262.09	291.21	320.33	349.45	407.70	3.6
88.17	94.05	105.81	117.57	132.26	146.96	235.13	264.52	293.91	323.31	352.70	411.48	3.8
88.94	94.87	106.73	118.59	133.42	148.24	237.18	266.83	296.48	326.13	355.78	415.07	4.0
89.68	95.65	107.61	119.57	134.51	149.46	239.14	269.03	298.92	328.81	358.70	418.49	4.2
90.37	96.40	108.45	120.50	135.56	150.62	241.00	271.12	301.24	331.37	361.49	421.74	4.4
91.04	97.11	109.25	121.39	136.56	151.73	242.77	273.12	303.47	333.81	364.16	424.85	4.6
91.68	97.79	110.01	122.24	137.52	152.80	244.48	275.04	305.60	336.16	366.71	427.83	4.8
92.29	98.44	110.75	123.05	138.44	153.82	246.11	276.87	307.64	338.40	369.16	430.69	5.0
92.88	99.07	111.46	123.84	139.32	154.80	247.68	278.64	309.60	340.56	371.52	433.44	5.2
93.45	99.68	112.13	124.59	140.17	155.74	249.19	280.34	311.48	342.63	373.78	436.08	5.4
93.99	100.26	112.79	125.32	140.99	156.65	250.64	281.97	313.30	344.63	375.96	438.62	5.6
94.52	100.82	113.42	126.02	141.78	157.53	252.05	283.55	315.06	346.56	378.07	441.08	5.8
95.03	101.36	114.03	126.70	142.54	158.38	253.40	285.08	316.75	348.43	380.10	443.45	6.0
95.52	101.89	114.62	127.36	143.28	159.20	254.71	286.55	318.39	350.23	382.07	445.75	6.2
95.99	102.39	115.19	127.99	143.99	159.99	255.98	287.98	319.98	351.98	383.98	447.97	6.4
96.46	102.89	115.75	128.61	144.68	160.76	257.21	289.37	321.52	353.67	385.82	450.13	6.6
96.90	103.36	116.28	129.20	145.35	161.51	258.41	290.71	323.01	355.31	387.61	452.22	6.8
97.34	103.83	116.81	129.78	146.01	162.23	259.57	292.01	324.46	356.91	389.35	454.24	7.0
97.76	104.28	117.31	130.35	146.64	162.93	260.70	293.28	325.87	358.46	391.04	456.22	7.2
98.17	104.72	117.81	130.90	147.26	163.62	261.79	294.51	327.24	359.96	392.69	458.13	7.4
98.57	105.14	118.29	131.43	147.86	164.29	262.86	295.71	328.57	361.43	394.29	460.00	7.6
98.96	105.56	118.75	131.95	148.44	164.94	263.90	296.88	329.87	362.86	395.85	461.82	7.8
99.34	105.96	119.21	132.45	149.01	165.57	264.91	298.02	331.14	364.25	397.36	463.59	8.0
99.71	106.36	119.65	132.95	149.57	166.19	265.90	299.13	332.37	365.61	398.85	465.32	8.2
100.07	106.74	120.09	133.43	150.11	166.79	266.86	300.22	333.58	366.93	400.29	467.01	8.4
100.43	107.12	120.51	133.90	150.64	167.38	267.80	301.28	334.75	368.23	401.70	468.65	8.6
100.77	107.49	120.92	134.36	151.16	167.95	268.72	302.31	335.90	369.49	403.08	470.26	8.8
101.11	107.85	121.33	134.81	151.66	168.51	269.62	303.32	337.03	370.73	404.43	471.84	9.0
101.44	108.20	121.72	135.25	152.16	169.06	270.50	304.31	338.12	371.94	405.75	473.37	9.2
101.76	108.54	122.11	135.68	152.64	169.60	271.36	305.28	339.20	373.12	407.04	474.88	9.4
102.08	108.88	122.49	136.10	153.11	170.13	272.20	306.23	340.25	374.28	408.30	476.35	9.6
102.39	109.21	122.86	136.51	153.58	170.64	273.03	307.16	341.28	375.41	409.54	477.80	9.8
102.69	109.53	123.23	136.92	154.03	171.15	273.84	308.06	342.29	376.52	410.75	479.21	10.0
102.99	109.85	123.58	137.31	154.48	171.64	274.63	308.96	343.28	377.61	411.94	480.60	10.2
103.28	110.16	123.93	137.70	154.91	172.13	275.40	309.83	344.26	378.68	413.11	481.96	10.4
103.56	110.47	124.27	138.08	155.34	172.60	276.17	310.69	345.21	379.73	414.25	483.29	10.6
103.84	110.77	124.61	138.46	155.76	173.07	276.91	311.53	346.14	380.76	415.37	484.60	10.8
104.12	111.06	124.94	138.82	156.18	173.53	277.65	312.35	347.06	381.77	416.47	485.88	11.0
104.39	111.35	125.27	139.18	156.58	173.98	278.37	313.16	347.96	382.76	417.55	487.14	11.2
104.65	111.63	125.58	139.54	156.98	174.42	279.08	313.96	348.85	383.73	418.61	488.38	11.4
104.91	111.91	125.90	139.89	157.37	174.86	279.77	314.74	349.72	384.69	419.66	489.60	11.6
105.17	112.18	126.21	140.23	157.76	175.28	280.46	315.51	350.57	385.63	420.68	490.80	11.8
105.42	112.45	126.51	140.56	158.13	175.71	281.13	316.27	351.41	386.55	421.69	491.97	12.0

ONE POCKET MIXES KING

W	S	L	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
42	120	200	67	73	118	307	1487	220	157	237	386	59	6	65	73	95	340	1
42	128	213	67	78	126	319	1495	211	151	243	395	53	4	35	103	85	363	2
42	135	226	67	82	134	331	1501	203	146	247	404	48	1	17	208	81	384	3
58	200	275	93	121	163	425	1475	219	113	285	383	61	11	60	72	96	505	4
58	213	293	93	129	173	444	1483	210	109	291	391	56	4	30	262	90	538	5
58	226	311	93	137	184	462	1491	201	104	296	398	51	1	2	217	82	571	6
82	275	365	131	167	216	562	1451	234	86	296	384	60	12	50	144	99	681	7
82	310	411	131	188	243	611	1469	215	79	308	398	51	5	25	229	86	767	8
82	329	436	131	199	258	637	1477	206	76	313	405	47	0	0	270	78	814	9
42	120	200	67	73	118	307	1487	220	157	237	386	59	6	80	56	97	340	10
42	128	213	67	78	126	319	1495	211	151	243	395	53	5	70	83	92	363	11
42	143	239	67	87	141	344	1508	196	140	252	412	43	1	25	135	83	406	12
58	200	275	93	121	163	425	1475	219	113	285	383	61	8	70	72	96	505	13
58	225	309	93	136	183	460	1490	202	105	296	397	52	2	10	145	80	568	14
58	232	319	93	141	189	471	1494	198	102	299	401	49	1	2	264	78	586	15
82	275	365	131	167	216	562	1451	234	86	296	384	60	11	65	66	94	681	16
82	292	388	131	177	230	586	1460	224	82	302	392	55	10	50	83	89	723	17
82	311	412	131	188	244	612	1469	215	79	308	398	51	3	15	156	84	769	18
82	305	340	131	185	201	566	1451	232	85	327	356	81	11	65	96	97	686	19
82	343	383	131	208	227	614	1469	214	78	339	369	71	6	45	195	89	772	20
82	365	406	131	221	240	641	1477	205	75	345	375	67	5	15	248	87	820	21
58	220	255	93	133	151	425	1474	219	113	313	355	82	12	80	40	97	505	22
58	248	287	93	150	170	461	1489	202	104	326	368	72	4	25	84	91	569	23
58	263	305	93	159	180	481	1497	193	100	331	375	67	1	12	188	87	604	24
42	140	185	67	85	109	310	1488	217	156	274	353	83	11	85	32	99	346	25
42	158	208	67	96	123	334	1501	201	144	286	368	72	6	72	55	94	389	26
42	177	234	67	107	138	361	1514	186	133	297	383	61	1	35	95	90	437	27
42	188	249	67	114	147	377	1521	179	128	302	391	56	0	10	159	83	465	28
82	420	468	131	255	277	711	1496	185	68	358	389	57	2	15	177	86	945	29
82	410	450	131	249	266	694	1492	189	69	358	383	61	3	20	168	88	915	30
82	376	418	131	228	247	655	1481	201	74	348	378	65	11	50	116	92	845	31
58	330	383	93	200	227	568	1523	164	85	352	399	51	1	1	240	82	759	32
58	318	370	93	193	219	553	1519	168	87	349	396	53	2	20	119	85	732	33
58	298	345	93	181	204	526	1512	177	92	343	388	58	3	40	82	89	684	34
42	210	288	67	127	170	413	1534	163	117	308	412	42	3	20	179	89	530	35
42	198	262	67	120	155	391	1526	172	123	307	397	52	3	35	135	90	489	36
42	187	248	67	113	147	376	1520	179	128	302	391	56	4	55	118	92	463	37
82	320	365	131	194	216	590	1460	223	82	329	366	73	11	50	999	94	729	38
82	360	411	131	218	243	641	1477	205	75	340	379	64	9	20	999	90	820	39
82	383	437	131	232	259	670	1486	196	72	346	386	59	-1	10	999	84	872	40
82	320	320	131	194	189	563	1450	233	86	345	336	97	11	55	216	97	681	41
82	360	360	131	218	213	611	1467	215	79	357	349	87	6	20	999	90	766	42
82	383	383	131	232	227	638	1476	206	76	364	355	82	1	1	999	84	815	43
58	235	240	93	142	142	426	1473	218	113	335	334	100	8	75	78	97	505	44
58	279	285	93	169	169	479	1495	194	101	353	352	84	3	40	169	89	600	45
58	314	321	93	190	190	521	1509	178	92	365	364	75	-1	5	328	82	676	46
42	150	175	67	91	104	310	1487	217	155	293	334	99	11	75	46	97	346	47
42	178	208	67	108	123	346	1507	194	139	311	355	82	2	50	111	90	411	48
42	212	247	67	128	146	390	1525	173	124	329	375	67	-1	15	326	80	488	49
82	460	460	131	279	272	731	1500	180	66	382	373	68	0	3	300	82	979	50

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ONE POCKET MIXES KING

W	S	L	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
82	423	423	131	256	250	686	1489	191	70	374	365	74	1	15	296	82	900	51
82	368	368	131	223	218	620	1470	212	78	360	351	85	3	45	204	89	783	52
58	323	330	93	196	195	532	1513	175	91	368	367	73	0	5	322	82	695	53
58	290	295	93	176	175	491	1500	189	98	358	355	82	0	25	176	89	622	54
58	252	258	93	153	153	447	1482	208	108	342	342	93	1	60	106	95	543	55
42	206	241	67	125	143	383	1522	176	126	326	372	69	-1	5	238	78	476	56
42	184	215	67	112	127	354	1510	190	136	315	359	78	0	37	153	89	424	57
42	160	187	67	97	111	323	1495	208	149	300	342	92	1	77	85	95	369	58
82	290	460	131	176	272	628	1476	209	77	280	434	31	8	57	999	95	798	59
82	308	489	131	187	289	656	1484	200	74	285	441	27	6	25	999	83	848	60
82	327	520	131	198	308	685	1492	192	70	289	449	23	3	3	899	81	901	61
58	200	340	93	121	201	464	1493	201	104	262	434	30	6	57	999	96	574	62
58	213	361	93	129	214	484	1500	192	100	267	441	27	5	45	999	83	611	63
58	226	384	93	137	227	505	1508	184	95	271	450	22	3	10	999	79	649	64
42	115	235	67	70	139	324	1499	208	149	215	429	33	8	60	999	94	372	65
42	122	250	67	74	148	337	1506	200	143	219	438	28	1	45	999	88	396	66
42	130	266	67	79	157	352	1513	191	137	224	448	23	-3	5	999	80	421	67
82	435	560	131	264	331	775	1512	170	62	340	428	34	1	2	204	79	1059	68
82	415	535	131	252	317	748	1506	176	64	336	423	36	1	15	140	81	1011	69
82	390	505	131	236	299	715	1498	184	67	331	418	39	6	30	109	83	952	70
82	370	470	131	224	278	682	1490	193	71	329	408	45	7	50	100	89	894	71
58	285	390	93	173	231	545	1518	171	88	317	424	36	-1	2	274	77	718	72
58	260	360	93	158	213	512	1509	182	94	308	416	40	0	17	153	80	660	73
58	240	330	93	145	195	482	1498	193	100	302	405	47	3	50	119	89	606	74
42	170	270	67	103	160	378	1523	178	127	272	422	37	1	15	192	82	468	75
42	160	255	67	97	151	363	1516	185	133	267	415	41	3	40	115	89	441	76
42	150	240	67	91	142	348	1510	193	138	261	408	45	5	57	96	92	415	77
82	345	405	131	209	240	628	1474	209	77	333	381	62	8	52	152	96	798	78
82	388	456	131	235	270	685	1490	192	70	344	394	54	5	40	242	89	898	79
82	437	513	131	265	304	748	1505	176	64	354	406	46	1	10	999	80	1011	80
58	240	295	93	145	175	461	1490	202	105	315	379	64	10	60	104	99	569	81
58	270	332	93	164	196	501	1504	185	96	326	392	55	3	40	139	92	640	82
58	304	373	93	184	221	546	1518	170	88	337	404	47	0	5	999	81	720	83
42	148	204	67	90	121	326	1497	207	148	275	370	70	11	70	173	99	374	84
42	176	246	67	107	146	368	1517	183	131	290	396	53	1	50	169	94	449	85
42	198	276	67	120	163	399	1529	169	121	301	409	44	0	10	329	82	504	86
82	514	600	131	312	355	846	1525	155	57	368	420	38	-1	2	310	84	1185	87
82	470	550	131	285	325	790	1514	166	61	361	412	43	0	17	142	89	1085	88
82	420	490	131	255	290	724	1500	181	67	352	400	50	1	45	114	93	968	89
58	330	405	93	200	240	581	1527	160	83	344	413	42	0	12	165	83	782	90
58	305	370	93	185	219	545	1518	171	88	339	402	49	3	50	150	91	718	91
58	285	350	93	173	207	521	1511	178	93	332	398	52	4	55	122	95	676	92
42	187	324	67	113	192	421	1538	160	115	269	456	19	0	15	147	87	544	93
42	195	276	67	118	163	397	1529	170	121	298	411	43	1	48	190	92	501	94
42	175	250	67	106	148	370	1518	182	130	287	400	50	1	65	130	93	452	95
50	220	255	80	133	151	413	1500	194	117	323	366	73	4	7	160	81	505	96
50	210	250	80	127	148	404	1497	199	119	315	367	73	3	20	83	93	489	97
58	200	280	93	121	166	428	1476	217	113	283	387	58	3	55	51	96	511	98
58	240	336	93	145	199	485	1500	191	99	300	410	44	0	5	239	82	613	99
58	254	322	93	154	191	486	1499	191	99	317	392	55	3	10	230	84	613	100

8935

ONE POCKET MIXES KING

W	S	L	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
64	225	295	103	136	175	462	1469	222	104	295	378	65	10	60	50	98	553	101
64	300	392	103	182	232	565	1506	182	85	322	411	43	0	3	194	83	736	102
64	280	366	103	170	217	537	1497	191	90	316	403	48	1	13	109	87	687	103
70	266	384	112	161	227	549	1483	204	88	294	414	42	5	40	100	93	691	104
70	330	435	112	200	257	618	1504	182	78	324	417	40	5	10	180	82	814	105
70	330	435	112	200	257	618	1504	182	78	324	417	40	5	3	159	83	814	106
55	205	270	88	124	160	420	1484	210	115	296	380	63	12	80	43	98	505	107
55	275	340	88	167	201	504	1515	175	96	331	399	51	3	3	337	78	654	108
55	260	315	88	158	186	480	1507	184	100	328	388	58	3	10	116	86	612	109
60	207	273	96	125	162	431	1470	223	112	291	374	67	8	70	55	99	511	110
60	280	320	96	170	189	503	1498	191	96	337	376	66	0	5	213	72	638	111
60	270	310	96	164	183	491	1494	196	98	333	373	68	3	17	160	89	617	112
75	280	460	120	170	272	610	1489	197	79	278	446	24	5	30	143	92	787	113
75	297	487	120	180	288	637	1497	189	76	283	453	21	2	5	196	83	834	114
75	301	483	120	182	286	637	1497	189	76	287	449	23	2	20	102	89	834	115
54	185	255	87	112	151	398	1478	218	121	282	379	64	11	60	52	93	468	116
54	225	303	87	136	179	450	1501	192	107	303	398	51	4	5	264	77	562	117
71	250	330	114	152	195	509	1464	224	95	298	384	61	12	60	57	94	617	118
71	325	405	114	197	240	599	1495	190	81	329	400	50	5	1	171	79	777	119
51	165	235	82	100	139	369	1477	222	131	271	377	65	11	65	48	98	426	120
51	203	277	82	123	164	417	1499	196	116	295	393	54	2	20	137	83	511	121
53	180	270	85	109	160	402	1485	211	120	271	397	52	14	60	61	94	479	122
53	230	330	85	139	195	468	1511	182	103	298	417	40	1	5	214	78	596	123
54	230	340	87	139	201	475	1511	182	101	293	423	36	8	20	128	84	606	124
65	240	360	104	145	213	511	1486	204	94	285	417	40	14	45	79	88	638	125
65	262	398	104	159	235	547	1498	191	88	290	431	32	3	15	169	79	702	126
58	200	270	93	121	160	422	1473	220	114	287	378	64	11	60	46	96	500	127
58	210	290	93	127	172	440	1482	211	110	289	390	56	6	48	113	91	532	128
42	115	215	67	70	127	312	1492	215	154	223	407	46	10	60	71	94	351	129
42	128	242	67	78	143	336	1505	200	143	231	426	35	5	45	175	94	394	130
51	185	315	82	112	186	428	1505	191	112	262	435	30	3	40	111	90	532	131
51	208	322	82	126	191	447	1512	183	108	282	427	34	7	30	95	90	564	132
51	195	335	82	118	198	446	1512	183	108	265	444	25	0	10	212	90	564	133
71	250	330	114	152	195	509	1464	224	95	298	384	61	12	60	57	94	617	134
71	325	405	114	197	240	599	1495	190	81	329	400	50	5	1	171	79	777	135
71	320	405	114	194	240	596	1494	191	81	326	402	49	0	5	155	81	771	136
78	380	425	125	230	251	655	1492	191	74	352	384	60	6	7	125	83	856	137
78	377	423	125	228	250	652	1491	192	74	350	384	60	6	15	135	82	851	138
78	372	428	125	225	253	652	1491	192	74	346	388	57	3	5	218	83	851	139
78	347	400	125	210	237	620	1482	202	78	339	382	62	3	7	212	86	795	140
65	315	340	104	191	201	544	1495	191	89	351	369	71	4	1	358	81	697	141
65	272	318	104	165	188	505	1482	206	95	326	372	69	8	17	128	91	628	142
65	281	329	104	170	195	517	1486	201	93	329	376	66	3	15	212	89	649	143
48	205	300	77	124	178	427	1516	180	113	291	416	40	5	25	161	86	537	144
48	220	320	77	133	189	448	1523	172	108	298	423	37	3	20	353	83	574	145
48	228	329	77	138	195	458	1526	168	105	302	425	35	2	15	375	82	593	146
42	210	290	67	127	172	414	1535	162	116	307	414	41	3	1	316	77	532	147
42	175	265	67	106	157	378	1522	178	127	280	414	41	3	30	138	88	468	148
42	155	245	67	94	145	354	1512	190	136	265	409	44	5	42	100	92	426	149
87	345	495	139	209	293	690	1481	202	70	303	425	35	8	40	170	93	894	150

ONE POCKET MIXES KING

W	S	L	VW	Vs	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
87	400	575	139	242	340	770	1501	181	63	315	442	26	2	10	152	84	1037	151
87	393	582	139	238	344	770	1501	181	63	309	447	24	2	10	226	81	1037	152
42	195	270	67	118	160	393	1527	171	123	300	406	46	4	7	284	81	495	153
42	205	290	67	124	172	411	1534	164	117	302	417	40	2	1	305	78	527	154
42	195	275	67	118	163	396	1529	170	122	298	410	44	1	10	248	80	500	155
65	310	335	104	188	198	538	1493	193	90	349	368	72	7	5	236	82	686	156
65	273	322	104	165	191	508	1483	205	95	325	375	67	3	25	88	90	633	157
65	283	332	104	172	196	520	1487	200	93	330	378	65	2	15	136	86	654	158
50	175	300	80	106	178	412	1503	195	117	258	431	32	5	60	132	94	505	159
50	265	375	80	161	222	511	1535	157	94	314	434	30	3	5	317	75	681	160
50	223	337	80	135	199	463	1521	173	104	292	431	32	2	15	161	82	596	161
39	140	235	63	85	139	335	1518	187	144	254	416	41	3	37	199	89	399	162
39	180	270	63	109	160	380	1536	165	127	287	421	38	1	0	570	74	479	163
39	165	255	63	100	151	362	1529	173	133	277	417	40	4	15	430	83	447	164
70	315	370	112	191	219	570	1489	197	85	335	384	60	8	35	104	88	729	165
70	360	400	112	218	237	615	1502	182	78	355	385	60	1	1	216	83	809	166
70	334	391	112	202	231	594	1496	189	81	341	389	57	2	15	288	82	771	167
42	143	239	67	87	141	344	1508	196	140	252	412	43	1	25	135	83	406	168
42	152	254	67	92	150	358	1514	188	135	257	420	38	0	10	216	77	432	169
65	280	375	104	170	222	544	1496	191	89	312	408	45	0	7	337	80	697	170
65	310	415	104	188	246	586	1509	178	82	321	419	39	-2	1	394	78	771	171
65	270	365	104	164	216	532	1493	196	91	308	406	46	2	20	155	85	676	172
64	270	385	103	164	228	542	1499	189	89	302	420	38	5	40	71	94	697	173
64	235	345	103	142	204	497	1484	206	97	286	410	44	11	52	112	98	617	174
64	280	397	103	170	235	555	1503	185	87	306	423	36	2	35	71	90	720	175
65	230	300	104	139	178	469	1468	222	103	297	378	64	8	80	46	99	564	176
65	284	324	104	172	192	516	1486	202	93	333	371	69	3	15	154	83	647	177
65	263	292	104	159	173	485	1474	215	99	329	357	80	2	27	100	89	590	178
65	255	385	104	155	228	535	1494	195	90	289	426	35	3	35	85	93	681	179
65	275	410	104	167	243	562	1503	185	86	297	432	32	1	7	169	84	729	180
65	285	422	104	173	250	575	1507	181	84	301	434	30	0	22	133	87	752	181
64	220	330	103	133	195	479	1477	214	101	278	407	46	9	72	70	99	585	182
64	275	385	103	167	228	545	1500	188	88	306	418	39	2	25	117	89	702	183
63	230	360	101	139	213	502	1489	201	96	278	425	35	6	52	171	94	628	184
63	270	390	101	164	231	544	1503	186	89	301	425	36	3	12	227	85	702	185
64	230	340	103	139	201	491	1482	209	98	284	409	44	3	60	69	97	606	186
64	298	396	103	175	234	560	1505	183	86	312	419	39	2	10	218	85	728	187
77	275	395	123	167	234	572	1470	216	84	291	409	45	9	70	45	98	713	188
77	340	465	123	206	275	653	1495	189	74	316	421	37	2	30	171	88	856	189
61	265	305	98	161	180	487	1489	201	99	330	371	70	20	10	128	84	606	190
61	240	330	98	145	195	487	1490	201	99	299	401	49	2	20	233	89	606	191
50	150	255	80	91	151	370	1483	216	130	246	408	45	18	60	100	99	431	192
50	200	340	80	121	201	451	1518	178	107	269	446	24	13	20	145	85	574	193
50	210	365	80	127	216	472	1525	170	102	270	458	18	5	10	999	77	612	194
50	205	370	80	124	219	472	1525	170	102	264	464	15	2	10	999	85	612	195
65	280	510	104	170	302	624	1521	167	77	272	484	7	-15	1	312	84	840	196
65	255	535	104	155	317	623	1522	167	77	248	508	-3	-2	17	999	87	840	197
65	276	540	104	167	320	639	1525	163	75	262	500	0	-3	3	364	77	868	198
61	318	212	98	193	125	464	1476	211	104	415	270	170	30	5	280	79	564	199
61	280	230	98	170	136	452	1472	216	107	376	301	132	40	15	115	86	543	200

ONE POCKET MIXES KING

W	S	L	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
61	255	265	98	155	157	457	1476	214	105	338	343	92	22	25	92	94	553	201
55	220	360	88	133	213	483	1510	183	100	276	441	27	6	17	124	89	617	202
55	230	390	88	139	231	507	1518	174	95	275	456	19	5	15	545	83	660	203
55	225	395	88	136	234	506	1518	174	95	269	462	17	3	12	317	87	660	204
47	170	250	75	103	148	374	1498	201	129	275	395	53	12	35	162	96	447	205
47	200	290	75	121	172	416	1516	181	116	291	412	43	3	10	270	83	521	206
47	195	295	75	118	175	416	1516	181	116	284	419	38	2	12	233	87	521	207
94	375	750	151	227	444	870	1509	173	55	261	510	- 4	6	5	999	89	1197	208
94	360	765	151	218	453	870	1510	173	55	251	520	- 8	9	60	999	80	1197	209
94	305	745	151	185	441	825	1501	183	58	224	535	- 13	2	50	999	94	1117	210
94	365	895	151	221	530	950	1525	159	51	233	558	- 21	0	10	999	80	1340	211
47	200	260	75	121	154	399	1508	189	121	304	386	59	18	20	155	86	489	212
47	200	295	75	121	175	419	1517	180	115	289	416	40	12	20	169	82	527	213
47	209	321	75	127	190	440	1525	171	110	288	432	32	15	7	144	89	564	214
47	185	345	75	112	204	440	1526	171	110	255	464	15	6	10	230	87	564	215
47	180	350	75	109	207	440	1526	171	110	248	471	12	3	17	999	87	564	216
61	265	305	98	161	180	487	1489	201	99	330	371	70	15	12	124	80	606	217
61	250	320	98	152	189	487	1489	201	99	311	389	57	25	22	96	86	606	218
61	245	370	98	148	219	513	1500	190	94	289	426	34	13	30	999	85	654	219
61	260	395	98	158	234	537	1508	182	90	293	435	30	7	20	999	84	697	220
72	350	575	115	212	340	716	1524	161	67	296	475	10	- 1	12	999	76	984	221
72	355	570	115	215	337	716	1524	161	67	301	471	12	2	12	247	77	984	222
42	95	140	67	58	83	256	1450	263	188	225	324	109	15	80	999	99	250	223
42	140	205	67	85	121	322	1495	209	150	264	377	65	3	31	108	96	367	224
42	175	240	67	106	142	364	1515	185	133	292	391	56	3	11	182	84	441	225
65	285	465	104	173	275	600	1514	174	80	288	458	18	3	7	270	78	798	226
65	258	442	104	156	262	570	1506	183	85	274	459	18	3	22	225	90	745	227
38	110	240	61	67	142	318	1517	192	152	210	447	24	1	32	214	79	372	228
38	132	258	61	80	153	342	1527	178	141	234	447	24	1	20	259	77	415	229
64	306	555	103	185	328	665	1533	154	73	279	494	2	- 5	30	400	73	916	230
64	320	540	103	194	320	664	1533	154	73	292	481	8	5	15	999	82	915	231
64	260	435	103	158	257	566	1508	181	85	279	455	20	8	30	999	89	739	232
85	380	730	136	230	432	847	1522	161	57	272	510	- 4	6	7	311	77	1181	233
85	345	710	136	209	420	814	1517	167	59	257	516	- 6	3	15	999	83	1122	234
0	0	0	0	0	0	49	1944	3	991	2	4	27212	0	0	0	0	1	235
38	270	330	61	164	195	468	1564	130	103	350	417	40	- 5	0	999	68	638	236
38	277	323	61	168	191	468	1564	130	103	359	408	45	- 5	0	999	70	638	237
38	295	315	61	179	186	474	1564	128	102	377	393	54	- 5	0	999	71	649	238
42	200	200	67	121	118	355	1510	190	136	341	333	100	0	3	223	77	426	239
42	200	200	67	121	118	355	1510	190	136	341	333	100	0	5	207	74	426	240
47	290	290	75	176	172	471	1531	160	102	373	364	74	- 5	3	999	73	617	241
47	260	240	75	158	142	423	1515	178	114	372	336	98	- 1	5	327	78	532	242
52	270	230	83	164	136	431	1498	193	112	379	316	117	0	3	204	82	532	243
56	270	230	90	164	136	438	1485	205	110	374	311	122	- 1	1	386	81	532	244
66	335	265	106	203	157	514	1479	206	94	395	305	128	1	10	93	85	638	245
71	400	320	114	242	189	594	1490	192	81	408	319	114	- 1	5	312	78	766	246
75	440	320	120	267	189	624	1488	192	77	427	303	130	0	3	319	80	809	247
80	470	340	128	285	201	662	1485	194	73	430	304	129	- 1	3	443	78	862	248
85	505	355	136	306	210	701	1483	194	69	437	300	134	- 1	0	548	78	915	249
59	270	230	95	164	136	442	1476	214	109	370	308	125	0	10	107	84	532	250

ONE POCKET MIXES   KING

W	S	L	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
61	280	220	98	170	130	446	1469	219	108	381	292	142	5	15	89	90	532	251
54	220	280	87	133	166	434	1494	200	111	307	382	62	15	18	81	96	532	252
54	235	295	87	142	175	452	1501	192	107	315	386	59	2	8	999	87	564	253
54	235	295	87	142	175	452	1501	192	107	315	386	59	2	3	168	85	564	254
48	195	260	77	118	154	397	1503	194	121	298	387	58	2	5	200	84	484	255
49	185	235	79	112	139	378	1490	208	128	297	368	72	9	28	999	89	447	256
49	210	255	79	127	151	405	1502	194	119	314	373	68	6	8	188	83	495	257
46	200	250	74	121	148	391	1509	189	123	310	378	64	5	10	150	83	479	258
46	170	230	74	103	136	361	1496	204	134	285	377	65	10	33	999	93	426	259
42	150	210	67	91	124	331	1500	204	146	275	376	66	3	30	999	93	383	260
42	175	235	67	106	139	361	1514	187	134	294	386	59	4	8	214	83	436	261
58	255	305	93	155	180	476	1495	195	101	325	379	64	1	0	999	78	596	262
58	240	285	93	145	169	455	1487	204	106	320	370	70	7	10	119	87	559	263
72	320	365	115	194	216	574	1484	201	84	338	377	66	4	3	999	80	729	264
72	305	350	115	185	207	556	1478	208	87	333	373	68	10	8	92	86	697	265
39	120	190	63	73	112	296	1497	211	163	246	380	63	5	38	999	94	330	266
39	150	215	63	91	127	329	1514	190	147	276	387	58	2	5	333	79	388	267
82	330	440	131	200	260	640	1478	205	75	313	407	46	12	45	76	92	819	268
82	340	430	131	206	254	640	1478	205	75	322	397	52	12	60	48	97	819	269
82	385	485	131	233	287	700	1494	188	69	333	410	44	5	3	283	80	926	270
82	340	430	131	206	254	640	1478	205	75	322	397	52	15	55	84	96	819	271
82	365	455	131	221	269	670	1486	196	72	330	402	49	7	10	166	82	872	272
82	365	455	131	221	269	670	1486	196	72	330	402	49	9	14	131	83	872	273
82	355	460	131	215	272	667	1486	197	72	323	408	45	8	18	120	84	867	274
82	345	475	131	209	281	670	1487	196	72	312	420	38	7	23	108	86	872	275
82	335	485	131	203	287	670	1487	196	72	303	429	33	11	35	110	86	872	276
58	200	300	93	121	178	440	1482	211	110	276	404	48	11	65	44	97	532	277
58	200	325	93	121	192	455	1489	204	106	267	423	36	10	60	90	95	559	278
58	200	350	93	121	207	469	1495	198	103	258	441	27	6	55	92	91	585	279
58	200	400	93	121	237	499	1507	186	97	243	474	11	4	30	156	89	638	280
58	200	425	93	121	251	514	1512	181	94	236	489	4	4	15	500	89	665	281
58	200	450	93	121	266	529	1517	176	91	229	504	- 1	5	15	999	85	691	282
58	200	480	93	121	284	546	1523	170	88	222	520	- 8	0	3	999	82	723	283
58	200	375	93	121	222	484	1501	192	100	250	458	18	6	45	120	89	612	284
58	200	510	93	121	302	564	1528	165	85	215	535	- 13	- 1	0	999	83	755	285
58	200	525	93	121	311	573	1531	162	84	212	542	- 16	- 2	0	999	85	771	286
58	200	540	93	121	320	582	1533	160	83	208	549	- 18	- 3	0	999	81	787	287
42	120	200	67	73	118	307	1487	220	157	237	386	59	12	70	48	99	340	288
42	120	250	67	73	148	336	1505	200	143	216	440	27	6	45	125	91	394	289
42	120	300	67	73	178	366	1520	184	132	199	485	6	3	35	268	87	447	290
42	120	330	67	73	195	384	1528	176	126	190	509	- 4	1	8	804	85	479	291
42	120	360	67	73	213	401	1535	168	120	181	531	- 12	- 3	0	999	80	511	292
42	150	220	67	91	130	337	1503	200	143	270	387	59	12	45	60	95	394	293
42	150	260	67	91	154	360	1516	187	134	252	427	34	5	15	186	81	436	294
42	150	300	67	91	178	384	1526	175	126	237	462	16	0	13	284	83	479	295
42	150	330	67	91	195	402	1534	168	120	226	486	6	0	10	358	81	511	296
42	150	360	67	91	213	419	1540	160	115	217	508	- 3	- 5	0	899	77	543	297
58	200	340	93	121	201	464	1493	201	104	262	434	30	15	58	180	96	574	298
58	200	390	93	121	231	493	1505	188	98	246	468	14	12	48	999	93	628	299
58	200	440	93	121	260	523	1515	178	92	232	498	1	9	25	999	89	681	300

ONE POCKET MIXES KING

W	S	L	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
58	220	255	93	133	151	425	1474	219	113	313	355	82	19	75	60	99	505	301
58	200	470	93	121	278	540	1521	172	89	224	515	- 6	0	35	999	90	713	302
58	200	490	93	121	290	552	1525	168	87	219	525	- 10	- 3	8	999	85	734	303
42	115	235	67	70	139	324	1499	208	149	215	429	33	18	50	104	99	372	304
42	115	285	67	70	169	354	1515	190	136	197	477	10	10	45	500	89	426	305
42	115	335	67	70	198	383	1528	176	126	182	517	- 7	4	20	999	84	479	306
42	115	355	67	70	210	395	1533	170	122	176	531	- 12	- 3	30	999	87	500	307
42	115	385	67	70	228	413	1540	163	117	169	552	- 19	-13	3	999	79	532	308
42	90	235	67	55	139	309	1491	218	156	176	450	22	12	48	496	99	346	309
42	90	285	67	55	169	339	1509	199	142	161	498	1	6	65	999	90	399	310
42	90	300	67	55	178	348	1513	194	139	157	511	- 4	5	40	999	90	415	311
42	90	335	67	55	198	368	1523	183	131	148	538	- 14	-18	0	999	85	452	312
58	220	300	93	133	178	452	1487	206	107	295	393	55	15	65	96	99	553	313
58	220	350	93	133	207	482	1499	193	100	277	430	33	12	55	296	96	606	314
58	220	410	93	133	243	517	1512	180	93	258	469	13	6	48	999	90	670	315
58	220	460	93	133	272	547	1522	170	88	244	498	1	3	30	999	86	723	316
58	220	500	93	133	296	570	1529	163	85	234	519	- 7	- 3	15	999	86	766	317
42	140	185	67	85	109	310	1488	217	156	274	353	83	16	85	52	99	346	318
42	140	240	67	85	142	342	1507	197	141	248	415	41	13	60	128	98	404	319
42	140	300	67	85	178	378	1524	178	128	225	470	13	7	25	284	90	468	320
42	140	340	67	85	201	402	1534	168	120	211	501	0	- 3	1	999	79	511	321
82	275	480	131	167	284	630	1477	208	76	264	451	22	13	38	999	97	803	322
82	280	500	131	170	296	645	1482	204	75	263	459	18	11	33	999	93	830	323
82	280	540	131	170	320	669	1489	196	72	254	478	9	8	45	999	89	872	324
82	280	590	131	170	349	698	1498	188	69	243	500	0	6	38	999	88	926	325
82	280	650	131	170	385	734	1507	179	66	231	524	- 9	0	28	999	82	989	326
50	166	234	80	101	138	367	1481	218	131	274	377	65	16	25	73	94	426	327
50	200	360	80	121	213	463	1522	173	104	262	461	17	1	0	527	77	596	328
39	82	216	63	50	128	288	1495	217	167	172	443	26	12	33	104	91	317	329
44	194	341	71	118	202	438	1536	161	110	268	461	17	4	0	556	76	569	330
42	106	232	67	64	137	317	1495	212	152	203	433	31	11	30	143	92	360	331
42	150	320	67	91	189	396	1531	170	122	230	478	9	3	0	642	77	500	332
55	180	250	88	109	148	393	1472	224	123	277	376	66	19	43	83	95	457	333
55	235	408	88	142	241	520	1523	169	93	274	464	15	2	0	899	72	684	334
77	266	354	123	161	209	542	1459	228	89	297	386	59	17	30	108	85	660	335
77	350	590	123	212	349	733	1516	168	66	289	476	10	0	0	800	69	1000	336
59	200	270	95	121	160	424	1470	223	114	286	377	65	16	35	44	99	500	337
59	245	455	95	148	269	560	1522	169	86	265	480	8	2	0	352	77	745	338
44	143	220	71	87	130	336	1493	210	144	258	388	58	20	17	165	88	386	339
39	130	295	63	79	175	364	1533	172	132	216	479	9	4	4	300	80	452	340
38	75	190	61	45	112	267	1487	228	181	170	421	37	11	45	125	93	282	341
38	100	260	61	61	154	324	1521	188	149	187	475	10	2	0	303	77	383	342
48	148	273	77	90	162	376	1496	204	128	238	429	33	10	23	119	93	448	343
48	207	385	77	125	228	478	1534	161	101	262	476	10	3	0	999	74	630	344
64	224	296	103	136	175	462	1469	222	104	294	379	64	17	60	83	93	553	345
64	320	535	103	194	317	661	1532	155	73	293	479	9	2	0	999	70	910	346
49	175	280	79	106	166	398	1501	197	121	266	416	41	99	50	65	93	484	347
49	200	315	79	121	186	434	1515	181	111	279	429	33	99	33	165	88	548	348
42	145	260	67	88	154	357	1514	188	135	246	431	32	99	30	109	86	431	349
53	185	335	85	112	198	443	1504	192	109	253	447	24	99	40	105	88	553	350

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ONE POCKET MIXES KING

W	S	L	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
42	145	260	67	88	154	357	1514	188	135	246	431	32	99	28	175	87	431	351
42	160	260	67	97	154	366	1518	184	132	265	420	38	99	30	105	90	447	352
42	170	276	67	103	163	382	1524	176	126	270	428	34	99	10	179	80	474	353
42	170	276	67	103	163	382	1524	176	126	270	428	34	99	15	187	78	474	354
35	95	220	56	58	130	292	1520	192	165	197	446	24	99	20	301	71	335	355
42	145	260	67	88	154	357	1514	188	135	246	431	32	99	40	76	93	431	356
42	190	295	67	115	175	405	1533	166	119	284	431	32	99	8	196	82	516	357
42	180	275	67	109	163	387	1526	174	124	282	420	38	99	10	208	77	484	358
53	220	335	85	133	198	465	1511	183	104	287	427	34	99	60	45	97	590	359
53	275	420	85	167	249	548	1536	155	88	304	453	21	-5	0	450	71	739	360
53	230	310	85	139	183	456	1507	186	106	306	402	49	99	10	208	79	574	361
53	230	310	85	139	183	456	1507	186	106	306	402	49	99	3	244	79	574	362
37	105	210	59	64	124	295	1510	201	163	215	421	38	99	25	156	89	335	363
31	75	225	50	45	133	276	1537	180	174	164	482	8	99	0	490	68	319	364
31	70	190	50	42	112	253	1523	197	191	168	445	25	99	7	385	67	277	365
31	70	160	50	42	95	235	1511	211	205	181	403	48	99	21	141	74	245	366
37	110	205	59	67	121	295	1509	201	163	226	411	44	99	30	129	84	335	367
37	120	215	59	73	127	307	1516	193	157	237	414	42	99	18	161	84	356	368
42	160	285	67	97	169	381	1524	177	126	254	442	26	99	0	500	67	473	369
42	150	265	67	91	157	363	1517	185	133	250	432	32	99	19	218	79	441	370
42	190	305	67	115	180	411	1535	164	117	280	439	28	99	0	381	74	527	371
38	75	220	61	45	130	285	1500	214	169	160	457	19	99	99	999	94	314	372
42	85	260	67	52	154	321	1499	210	150	161	479	9	99	99	999	89	367	373
47	100	305	75	61	180	365	1498	207	132	166	495	2	99	99	999	95	431	374
52	115	355	83	70	210	411	1498	203	117	169	511	-4	99	99	999	92	500	375
56	130	390	90	79	231	448	1497	201	108	176	516	-6	99	99	999	93	553	376
33	65	190	53	39	112	253	1510	209	191	156	445	25	99	99	999	90	271	377
42	100	305	67	61	180	357	1517	189	135	170	506	-2	99	99	999	90	431	378
42	115	355	67	70	210	395	1533	170	122	176	531	-12	99	99	999	85	500	379
47	110	350	75	67	207	397	1513	190	121	168	521	-8	99	99	999	89	489	380
47	135	410	75	82	243	448	1531	168	108	183	542	-15	99	99	999	83	580	381
33	70	210	53	42	124	268	1520	198	180	158	464	15	99	99	999	86	298	382
33	105	320	53	64	189	354	1559	149	136	180	535	-13	99	99	999	74	452	383
38	95	290	61	58	172	338	1528	180	142	170	507	-3	99	99	999	73	410	384
38	130	405	61	79	240	428	1560	142	113	184	561	-22	99	99	999	73	569	385
42	115	355	67	70	210	395	1533	170	122	176	531	-12	99	99	999	85	500	386
42	155	475	67	94	281	491	1562	137	98	192	573	-25	99	99	999	72	670	387
47	135	400	75	82	237	442	1529	170	109	185	535	-13	99	99	999	86	569	388
47	175	530	75	106	314	543	1557	139	89	195	577	-27	99	99	999	72	750	389
47	150	470	83	91	278	501	1530	166	96	182	556	-20	99	99	999	84	660	390
52	200	600	83	121	355	608	1556	137	79	199	584	-29	99	99	999	75	851	391
56	175	530	90	106	314	558	1533	161	86	190	562	-22	99	99	999	85	750	392
56	210	635	90	127	376	641	1552	140	75	199	586	-29	99	99	999	75	899	393
28	70	210	45	42	124	260	1548	173	186	163	478	-9	99	99	999	74	298	394
28	80	250	45	48	148	289	1561	155	167	167	511	-4	99	99	999	71	351	395
33	80	250	53	48	148	297	1536	178	162	163	497	-1	99	99	999	77	351	396
33	90	285	53	55	163	324	1548	163	149	168	520	-8	99	99	999	73	399	397
38	80	250	61	48	148	306	1512	199	158	159	484	7	99	99	999	90	351	398
38	115	355	61	70	210	389	1548	157	124	179	540	-15	99	99	999	73	500	399
42	80	250	67	48	148	312	1494	216	155	155	474	11	99	99	999	94	351	400

ONE POCKET MIXES KING

W	S	L	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
42	65	210	67	39	124	279	1472	241	173	141	445	25	99	99	999	84	293	401
47	160	500	75	97	296	516	1551	146	93	188	573	-25	99	99	999	79	702	402
56	115	355	90	70	210	418	1484	215	115	167	503	-1	99	99	999	95	500	403
56	140	425	90	85	251	474	1508	189	102	179	530	-11	99	99	999	87	601	404
56	160	500	90	97	296	531	1526	169	91	183	557	-21	99	99	999	86	702	405
56	185	565	90	112	334	584	1540	154	82	192	572	-25	99	99	999	78	798	406
66	160	500	106	97	296	547	1500	193	88	177	541	-15	99	99	999	91	702	407
66	185	565	106	112	334	600	1516	176	80	187	557	-20	99	99	999	85	798	408
66	230	710	106	139	420	713	1542	148	68	195	589	-30	99	99	999	79	1000	409
38	90	285	61	55	169	332	1526	183	145	164	508	-3	99	99	999	84	399	410
38	105	320	61	64	189	362	1538	168	133	176	523	-9	99	99	999	80	452	411
42	125	390	67	76	231	422	1543	159	114	180	547	-17	99	99	999	82	548	412
42	160	485	67	97	287	499	1564	135	97	194	575	-26	99	99	999	80	686	413
52	105	320	83	64	189	385	1485	217	125	166	492	3	99	99	999	94	452	414
52	115	355	83	70	210	411	1498	203	117	169	511	-4	99	99	999	92	500	415
52	125	390	83	76	231	438	1509	190	110	173	527	-10	99	99	999	89	548	416
52	175	530	83	106	314	551	1544	151	87	192	569	-24	99	99	999	81	750	417
56	125	390	90	76	231	444	1496	202	108	170	519	-7	99	99	999	92	548	418
56	140	425	90	85	251	474	1508	189	102	179	530	-11	99	99	999	90	601	419
75	210	635	120	127	376	671	1510	179	72	190	560	-21	99	99	999	88	899	420
75	185	565	120	112	334	615	1495	195	78	182	544	-16	99	99	999	90	798	421
75	230	710	120	139	420	728	1524	165	66	192	577	-27	99	99	999	85	1000	422
33	75	230	53	45	136	283	1528	187	171	161	482	8	99	99	999	83	324	423
33	85	265	53	52	157	309	1542	171	156	167	507	-3	99	99	999	79	372	424
33	55	180	53	33	107	241	1503	220	200	138	442	26	99	99	999	94	250	425
33	80	250	53	48	148	297	1536	178	162	163	497	1	99	99	999	80	351	426
33	95	280	53	58	166	324	1548	163	149	178	511	-4	99	99	999	78	399	427
33	115	355	53	70	210	381	1568	139	127	183	552	-19	99	99	999	69	500	428
42	95	280	67	58	166	339	1508	199	142	170	489	4	99	99	999	90	399	429
42	105	320	67	64	189	368	1522	183	131	173	514	-5	99	99	999	81	452	430
42	80	250	67	48	148	312	1494	216	155	155	474	11	99	99	999	95	351	431
42	85	270	67	52	160	327	1503	206	147	158	489	5	99	99	999	93	378	432
47	115	355	75	70	210	403	1515	187	120	173	521	-8	99	99	999	88	500	433
47	125	390	75	76	231	430	1525	175	112	176	537	-14	99	99	999	85	548	434
47	90	285	75	55	169	347	1488	217	139	157	486	6	99	99	999	94	399	435
47	105	320	75	64	189	377	1503	200	128	169	503	-1	99	99	999	92	452	436
33	60	185	53	36	109	247	1507	214	195	147	443	26	99	99	999	93	261	437
33	65	200	53	39	118	259	1515	204	186	152	457	19	99	99	999	87	282	438
38	75	230	61	45	136	291	1504	210	166	156	468	14	99	99	999	93	324	439
38	85	270	61	52	160	320	1520	190	150	161	499	1	99	99	999	87	378	440
66	140	425	106	85	251	490	1479	216	98	173	513	-5	99	99	999	96	601	441
66	185	565	106	112	334	600	1516	176	80	187	557	-20	99	99	999	90	798	442
52	160	500	83	97	296	524	1537	159	92	185	564	-23	99	99	999	87	702	443
52	185	565	83	112	334	578	1550	144	83	194	578	-27	99	99	999	78	798	444
56	185	565	90	112	334	584	1540	154	82	192	572	-25	99	99	999	81	798	445
56	200	600	90	121	355	614	1547	146	78	197	578	-27	99	99	999	79	851	446
52	140	425	83	85	251	468	1520	178	103	181	537	-14	99	99	999	88	601	447
52	160	500	83	97	296	524	1537	159	92	185	564	-23	99	99	999	83	702	448
33	65	200	53	39	118	259	1515	204	186	152	457	19	99	99	999	90	282	449
33	75	235	53	45	139	286	1530	185	169	159	487	5	99	99	999	80	330	450

ONE POCKET MIXES KING

8942

W	S	L	VW	VS	VL	Y	D	VW%	VC%	VS%	VL%	T	R	SL	WIG	CF	A/C	J
38	90	285	61	55	169	332	1526	183	145	164	508	- 3	99	99	999	81	399	451
38	105	320	61	64	189	362	1538	168	133	176	523	- 9	99	99	999	75	452	452
42	160	500	67	97	296	508	1566	132	95	191	582	- 28	99	99	999	74	702	453
42	175	530	67	106	314	535	1571	126	90	198	586	- 29	99	99	999	69	750	454
47	185	565	75	112	334	570	1563	132	85	197	587	- 30	99	99	999	74	798	455
47	200	600	75	121	355	600	1569	126	80	202	592	- 31	99	99	999	70	851	456
85	255	780	136	155	462	801	1517	170	60	193	577	- 27	99	99	999	86	1101	457
52	210	635	83	127	376	635	1562	131	76	201	592	- 31	99	99	999	73	899	458
52	220	475	83	133	281	546	1540	153	88	244	515	- 6	99	99	999	71	739	459
38	115	355	61	70	210	389	1548	157	124	179	540	- 15	99	99	999	79	500	460
75	245	745	120	148	441	758	1530	159	64	196	582	- 28	99	99	999	82	1053	461
38	125	385	61	76	228	413	1556	148	117	184	552	- 19	99	99	999	76	543	462
42	105	320	67	64	189	368	1522	183	131	173	514	- 5	99	99	999	85	452	463
42	115	355	67	70	210	395	1533	170	122	176	531	- 12	99	99	999	82	500	464
56	150	460	90	91	272	501	1517	179	96	181	543	- 16	99	99	999	88	649	465
56	220	475	90	133	281	552	1530	162	87	241	509	- 3	99	99	999	74	739	466
66	220	475	106	133	281	568	1504	186	85	235	494	2	99	99	999	84	739	467
66	245	745	106	148	441	743	1547	142	65	200	593	- 31	99	99	999	77	1053	468

ONE POCKET MIXES AGGREGATE/CEMENT RATIOS BY WEIGHT

A	A/C	A	A/C	A	A/C	A	A/C	A	A/C
100	1.06	105	1.12	110	1.17	115	1.22	120	1.28
125	1.33	130	1.38	135	1.44	140	1.49	145	1.54
150	1.60	155	1.65	160	1.70	165	1.76	170	1.81
175	1.86	180	1.91	185	1.97	190	2.02	195	2.07
200	2.13	205	2.18	210	2.23	215	2.29	220	2.34
225	2.39	230	2.45	235	2.50	240	2.55	245	2.61
250	2.66	255	2.71	260	2.77	265	2.82	270	2.87
275	2.93	280	2.98	285	3.03	290	3.09	295	3.14
300	3.19	305	3.24	310	3.30	315	3.35	320	3.40
325	3.46	330	3.51	335	3.56	340	3.62	345	3.67
350	3.72	355	3.78	360	3.83	365	3.88	370	3.94
375	3.99	380	4.04	385	4.10	390	4.15	395	4.20
400	4.26	405	4.31	410	4.36	415	4.41	420	4.47
425	4.52	430	4.57	435	4.63	440	4.68	445	4.73
450	4.79	455	4.84	460	4.89	465	4.95	470	5.00
475	5.05	480	5.11	485	5.16	490	5.21	495	5.27
500	5.32	505	5.37	510	5.43	515	5.48	520	5.53
525	5.59	530	5.64	535	5.69	540	5.74	545	5.80
550	5.85	555	5.90	560	5.96	565	6.01	570	6.06
575	6.12	580	6.17	585	6.22	590	6.28	595	6.33
600	6.38	605	6.44	510	6.49	615	6.54	620	6.60
625	6.65	630	6.70	635	6.76	640	6.81	645	6.86
650	6.91	655	6.97	560	7.02	665	7.07	670	7.13
675	7.18	680	7.23	585	7.29	690	7.34	695	7.39
700	7.45	705	7.50	710	7.55	715	7.61	720	7.66
725	7.71	730	7.77	735	7.82	740	7.87	745	7.93
750	7.98	755	8.03	760	8.09	765	8.14	770	8.19
775	8.24	780	8.30	785	8.35	790	8.40	795	8.46
800	8.51	805	8.56	810	8.62	815	8.67	820	8.72
825	8.78	830	8.83	835	8.88	840	8.94	845	8.99
850	9.04	855	9.10	860	9.15	865	9.20	870	9.26
875	9.31	880	9.36	885	9.41	890	9.47	895	9.52
900	9.57	905	9.63	910	9.68	915	9.73	920	9.79
925	9.84	930	9.89	935	9.95	940	10.00	945	10.05
950	10.11	955	10.16	960	10.21	965	10.27	970	10.32
975	10.37	980	10.43	985	10.48	990	10.53	995	10.59
1000	10.64	1005	10.69	1010	10.74	1015	10.80	1020	10.85
1025	10.90	1030	10.96	1035	11.01	1040	11.06	1045	11.12
1050	11.17	1055	11.22	1060	11.28	1065	11.33	1070	11.38
1075	11.44	1080	11.49	1085	11.54	1090	11.60	1095	11.65
1100	11.70	1105	11.76	1110	11.81	1115	11.86	1120	11.91
1125	11.97	1130	12.02	1135	12.07	1140	12.13	1145	12.18
1150	12.23	1155	12.29	1160	12.34	1165	12.39	1170	12.45
1175	12.50	1180	12.55	1185	12.61	1190	12.66	1195	12.71