In submitting this draft I should like to call attention to the personnel of the Committee, which is composed of engineers in various branches of construction. It contains representatives of McGill University, University of Toronto, Ecole Polytechnique and the University of Manitoba, as well as those engaged entirely in concrete and reinforced concrete construction, in steel construction, in bridge work and in private practice.

In the course of our work, upon which a great deal of time has been spent both in private and in committee meetings by many members, very liberal use has been made of all the latest authoritative documents on the subject, not only in the English tongue but in French and German. In addition the Committee has been most fortunate in having Mr. Morssen search also the Austrian and Swiss literature.

It is with the greatest of pleasure that I acknowledge the hearty co-operation of the members of the Committee, and particularly the indefatigable interest of Mr. Mattice, Mr. Monsarrat, Mr. Morssen, Professor Brown, Professor MacKay, Mr. Rolph, Mr. Gillespie and Dr. Galbraith.

[For a complete copy of this report members are referred to Pages 198-203 of January 22nd, 1914, issue of The Canadian Engineer.)

Mr. Francis then moved that the report be received, and that the Committee be continued until next annual meeting with instructions to make a final report.

Mr. Brown suggested an amendment, if acceptable to Mr. Francis, viz., that the committee confer with similar committees of other engineering societies, especially with the American Society of Civil Engineers and Institution of Civil Engineers, now making investigations along similar lines, with the idea of unifying the work, and making it universally wide in scope, thereby getting the best results.

Mr. Francis replied that he would have very great pleasure in including Mr. Brown's suggestion with the motion if it were practicable, but that the committee had already made use of the reports of the other societies which were working for a long time along these lines. The Committee adopted their symbols, and had done everything possible to make the work conform with what other societies had been doing. The work of other Committees had been followed as closely as possible, not only in America, England, Ireland and Scotland, but in France, Germany, Austria, and Switzerland. It would be impracticable, Mr. Francis thought, to have a complete document ready inside of many years. These committees were composed of the most eminent engineers. They had a great deal of money at their disposal and this committee had not. Following the assumption of the last annual meeting it had merely presented the present draft for discussion. If this meeting allowed the work to go on, Mr. Morssen, as stated, had very kindly consented to make a series of special beams for the McGill Laboratories and the Professors of the University had stated their willingness to test them.

A discussion by Mr. Elmont followed:—

Mr. Elmont.—Mr. President, I would like to suggest that the specifications, which now deal comprehensively with both plain Concrete and Reinforced Concrete, should be arranged in such a way in the final draft, that the specifications for Concrete and those for Reinforced Concrete would be completely separated.

If they were bound in one pamphlet and the Reinforced Concrete specifications printed first, it would only be necessary to print in full a few sections for plain Concrete; while further information could be given by references to corresponding sections in the reinforced concrete specifications. As plain concrete and reinforced concrete structures are so widely different, I think that the specification would gain in clearness and practicability by this separation. A contractor who had to build a mass concrete structure according to this Society's specification for concrete structures, would, under the arrangement mentioned, find all the requirements his work had to meet under its own heading and concisely defined.

If it should be decided that it was desirable to separate the specifications, I would further suggest that the reinforced concrete specification be prefaced by a responsibility clause in accordance with the general practice followed by engineering societies.

As the specifications are arranged at present, Section 1, for instance, applies to all structures in which concrete is used. Undoubtedly, only Portland Cement should be used for reinforced concrete, but where economical conditions and the nature of the structure allow, it appears to me, that natural or slag cement should not be prohibited. This could be mentioned in the concrete specification, while the reinforced concrete specification would only permit Portland cement.

In Section 3 it is stated that the fragments of the crushed stone shall pass a circular hole 2½" in diameter. The maximum size for reinforced concrete is given in Sections 56 and 57, while it seems correct, also, to place these figures under Section 3 of "Materials." I would suggest, that instead of giving the maximum size of 2½", which, it might be stated, might quite properly be exceeded in a number of structures, that the maximum size depends upon the nature of the structure. It would, perhaps, be well to mention some of the structures in which the size must not exceed 2 or 2½".

As called for in Section 6, it is, no doubt, preferable that only fresh water should be applied to reinforced concrete, until further experiments have been made to determine the influence of the salt water, but for many mass concrete works, salt water is quite permissable.

With regard to the other paragraphs of the specification, I would like to submit that the headings "Method of Calculation" on Page 10, "Unit Stresses" on Page 12, and "General Requirement in Design" on Page 16, should be arranged as subheadings under a general heading called "Design."

The title of Section 19 might with advantage be changed to "Assumptions for Calculation" as they apply to all reinforced concrete design, and not only to beam and slab design. I would also suggest changing the beginning of the Section to read "Unless a more exact calculation is made, the calculation shall be based upon the following assumptions"; and placing Section 30, which is also a mere assumption, for the calculation, as "g"; also leaving out the 2nd, 3rd and 4th lines under "d", as these lines do not contain a new assumption, but simply a logical conclusion from the premises given in this Section.

The 2nd line of Section 20 I would suggest should be changed to, "A slab at the compression side of a beam may be.....", and after the last word in the first paragraph, might perhaps be added, "When the main reinforcement of the slab is parallel to the beam, only half of the above given widths should be taken as an integral part of the beam. I would recommend that the three first lines of the 2nd paragraph of Section 20 be left out, as in many designs the slab is placed at the bottom side of the beam over the supports, and so would not agree with the paragraph as it stands. The same would be the case if there was no reinforcing in the compression side over the supports, which is not impossible.

In reference to Section 21, I would submit to the Committee, if, in the interest of the public safety, it would not be advisable to adopt some regulation for flat slabs, perhaps in line with those given in the building code for the City of Cleveland.

Section 23 does not state the size of the test piece from which the ultimate strengths are determined; this will no doubt be added in the final draft.

Section 31 gives the physical properties of the steel reinforcement, but does not mention the chemical requirements. They are, of course, generally agreed upon, but as they can be given in a few lines I would submit that they should be stated.

The first line of Section 33 states that "not more than three parts of sand shall be added to one part of cement"; this applies to plain concrete structures, the mortar in reinforced concrete work is determined by Sections 36 and 37. The requirement that the mortar shall not be less than 1:3 is a rather severe one, mixtures 1:4:8 or even 1:5:10 have been and are being used with satisfactory results in numerous cases, where the stresses in the concrete are insignificant, i.e., the main point is weight. For all structures of any importance advance tests should be made compulsory in order to determine the voids and the proper mixture of the aggregates.

In Section 45 it is stated, that "the foundations shall be at least as large as the dimensions on the approved drawings." I would suggest that these words should be left out. Someone might think that this does not apply to the other parts of the structure.

Section 43 deals with the reinforcement in columns. As all experiments bear out the importance of a proper spacing of the ties and the hooping, I would recommend that it be said that the ties should not be spaced farther apart than the diameter of the column, and in no case should they be spaced more than 12", and that the hooping in columns, where it is allowed for in the calculation, should not be spaced more than 1-8 of the diameter and never more than 2½".

The concrete in slabs shall, according to Section 60, be deposited continuously with the concrete in the beams. As far as I am aware, no experiments or practical results prove the urgent necessity of this method of procedure, while numerous experiments plainly indicate that the slab can be concreted when the stem of the beam has set, without any detriment to the united action of slab and beam or to the transmission of shear forces at the joint. If the Committee decides to change this section it should be pointed out, as a matter of precaution, that the web reinforcement should be anchored carefully both in the slab and at the bottom of the beam, and that the joint must not be too smooth and must be thoroughly cleansed before depositing the concrete for the slab.

Some very good measures to avoid failures in reinforced concrete work are established by the regulations given in Section 63, the greater part of the failures which have occured being undoubtedly due to too early removal of the forms. Only a few other societies' reinforced concrete specifications contain such detailed rules as we will secure. Some specifications make a distinction between slabs and beams over and under 10 or 15-foot span. This, I think, is worthy of imitation, now that we are using slabs without beams, resting only on columns of as much as 20 or even 25-foot span, and simply supported reinforced concrete beams have reached the 100-foot mark.