PREPARATION, MAINTENANCE, AND USE OF MASTER SPECIFICATIONS.

by

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A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements for the degree Master of Architecture.

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March 1961

PREFACE

Increasing difficulties in utilizing architectural specification source material in an efficient manner led to the present investigation.

Over a trial period of four years of routine project work, various existing systems aimed at organized specification writing, failed to stand the test of speed and accuracy. Ready written specifications have been found too rigid, Filing Systems too incoherent and too cumbersome to handle. The ideal system is thought to be one which can be operated with one hand from the desk, and which is mnemonic and flexible like an encyclopedia. Such a system does not exist.

The main problem, that of its organization, cannot be fully isolated. It radiates into office practice, technology, and knowledge classification, which in return are its tributaries. But the point where the three converge can be analized to discover their configuration.

As any point in space can be determined by three co-ordinates, it is hoped that any specification item can be placed or found by an analogous method within the volume of specification source material, once its pattern is known.

Although care has been exercised to discover precedents to applicable geometrical concepts, none could be found:

Forty-one countries[1] are represented in the International Organization of Standardization which employs the Universal Decimal Classification System. The UDC, applicable in a broad scope, is however not engineered to perform the various special functions required from a specification system.

North America is the continent with the most diversified building material production in a most diversified climate. In less industrialized and smaller countries an urgency to classify building materials simply does not exist, as the relative few materials available or used can almost be memorized.

The British and European Bill-of-Quantity system has been examined. Its structure is practically identical with the North American sectional division of the specification and therefore merits no special elaboration.[2]

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1. Albania, Australia, Austria, Belgium, Brazil, Bulgaria, Burma, Canada, Chile, Czecoslowakia, Denmark, Egypt, England, Finland, France, Germany, Greece, Holland, India, Indonesia, Ireland, Israel, Italy, Japan, Jugoslavia, Mexico, New Zealand, Norway, Pakistan, Poland, Portugal, Roumania, Russia, South Africa, Spain, Sweden, Switzerland, Turkey, Hungaria, U.S.A., Venezuela.

2. Bill of Quantities - a loose-leaf pad used by British quantity surveyors. The German Verdingungsordnung fuer Bauleistungen (transl. Tendering Rules for Building Construction) lists but sixteen architectural sections.

Finally, because the accelerated growth of specification source material is a comparatively recent phenomenon, it may be assumed that any organizational system that was not known during the past decade is now outdated. Inquiries aimed at obtaining systems mentioned by Reeve-Sleeper and Goldsmith failed.[1]

From the total evidence collected it appears that current efforts are directed towards the development of detail specifications but that the development of a uniform system under which such details would fall into place is not under study at the present time.

Not being a student of library science, I have leaned heavily on theoretical precepts provided by Vickery, Sayers, Phillips, and Bliss. The integration of those theories to the proposed form emerged after a sequence of trials and errors. By then the problem and its unworkable solutions were so familiar, that the few remaining "workable elements" became recognizable. They held true if reversed, and also when subjected to "diagonally opposite" tests.

The unconventional result, which is neither a Ready Written Specification nor a Filing System, may be described as a One-Place Collection of Specification Elements, to which access is provided through a combination of concepts, analogous in function to that of a master key. The name Master Specification has been derived from that analogy.

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1. The New York Building Congress abandoned its Dual Specification system in 1958. The American Construction Specification Institute maintains no system. Other authorities mentioned could not be located.

To Julien J. Olson, Chief Specifications, Department of Public Works of Canada, who supervised my work from 1956 - 1959 I am indebted for his constant interest, encouragement and repeated constructive criticism which continued to this date.

To Miss Virginia Murray, Associate Professor Library School, McGill University, Montreal, and Mr. Ron Spalding, Librarian, Air Service Library, Department of Transport of Canada, who recommended and selected treatises pertinent to knowledge classification and library mechanics, I owe a debt of lasting gratitude.

Profound thanks are due to the staff of the Canadian Standards Association and the Canadian Government Specification Board for their assistance in securing foreign standard specifications and their indexes, and to Miss Nancy Lugsdin for proofreading the draft.

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INTRODUCTION

The process of preparing Project Specifications concentrates on the presentation of excerpts from a region of knowledge, selec-ed and re-composed to fill a given set of requirements.

It can be broken down into five steps:

i. A survey of drawings to produce a List of Requirements.

ii. Arrangement of Requirements to form tentative Sections.

iii. Consultation of source material for the Rough Draft.

iv. Elimination of inconsistencies to make up the Final Draft.

v. Typing of the Final Draft.

The basis for step i has been laid down by Ackerman:

> Under the general theory as to the relation of drawings and specifications, it was assum-ed that the general drawings were to give explicit information in terms of dimensions...
> .....
> ..... Since the drawings gave no information as to the use of materials, there could be no possibility of conflict between drawings and specifications in this respect.[1]

Procedures for step v can be regarded as defined, as they are described with most works published.

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1. Harold Reeve-Sleeper, Architectural Specifications, New York, John Wiley & Sons, 1955, Foreword by Frederick L. Ackerman, p. v.

Problems inherent in steps ii, iii, and iv, become apparent through their symptoms:

1. There is no conclusive "Index of Sections", hence what is their order and what is their extent?

2. Individual source material collections are arranged differently. Since all deal with an identical subject, why could not the notation of a catalogue file harmonize with the notation of a master-copy?

3. Descriptions of identical objects vary with each source consulted. Could not but one source be created to eliminate errors?

Co-ordination would eliminate inconsistencies, overlapping, and would uncover weak ground. Without it, production is principally based on stray knowledge.

The problem then can be stated to be one of minimizing the effort of preparing, maintaining and using a collection of specification source material in the form of a Master Specification set up to permit but one interpretation of each variety of its content matter, which is arranged to have but one place in a flexible, consistent pattern, which, in turn, is set in proper relation to specification source material from allied professions.

Architectural Specification Source Material shall include material and work descriptions under the jurisdiction of an architect, but exclude specifications of allied professions, contractual requirements and description of project scopes.

However, the relationship of specifications of allied professions and trades to the Architectural Specifications, shall be established, because the combined scope of Project Specifications cannot be limited to architectural materials and methods alone.

Architectural specification source material can be viewed as a minor branch of knowledge:

(i) As the number of materials and methods increases, specification literature will increase in volume and the problem of coping with it will increase. Vice-versa, it is hoped that by tracing back, the origin of the problem can be discovered at the point where specification knowledge branches off from general knowledge.

(ii) Since any one field of knowledge is imbedded in and cannot be effectively separated from knowledge in general, and since the organization of general knowledge has been developed, it may be concluded that the set of criteria applicable to the classification of general knowledge is also applicable to the classification of special knowledge.

(iii) Since the amount of specification source material constitutes but a fraction of general knowledge and since general knowledge is well organized as a whole, it may be anticipated that specification source material can be organized approaching an efficiency reciprocal to that fraction.

Inventory has been taken of the field in which architectural technical building knowledge and library science converge. This field is small, but its fertility has led to phenomena which have been bridged by architects with tolerance in pursuit of farther goals.

Organized finance, organized effort, organized space, are commonplace among architects, but organized knowledge is taken for granted, often in honest self-deceit, as its true extent and nature fail to communicate themselves to the individual.

On the other side, library science has developed theories and methods as its primary goal. Presuming that 5,000 entries would satisfy a specification knowledge scheme and 500,000 entries a general knowledge scheme, the librarians' problem is at least one hundred times greater both in quantity and quality. Typical architectural entries read "Brick, Fire Escapes, Concrete Area Wells", etc., typical library entries read "The Influence of X-rays on the Sensibility of Bacillus Coli treated with Penicillin, The Molecular Re-orientation of Polythene by Means of Ionizing Radiations, The Treatment of Osteomyelitis of the Femur with Streptomycin" etc.

While it is easy to place Brick under Unit Masonry, Fire Escapes under Miscellaneous Metals, Concrete Area Wells under Concrete, under what group could complex relations such as those quoted above possibly be classified?

The techniques described by Vickery[1] solve this problem by nominalistic analytical method. Meanings are established, eliminating overlapping and synonymous concepts. "Dehydration" is realized as "REMOVAL of WATER", a combination of Process and Substance, which constitute two "categories". A possible number of categories

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1. B.C. Vickery, Classification and Indexing in Science, London, Butterworths Scientific Publications, 1958.

is established, and a combination order is devised. Limited by literary warrant, this forms part of a "Field", which in turn forms part of a "Main class" under the "Universal Knowledge".

In contrast to such a nearly arithmetical method stands the failure of architectural systems to conclusively classify Radial Brick Chimneys, Curtain Walls, Laboratory Equipment, i.e. building components which can have several associations.

Organized knowledge does not follow identical lines in each field. Literary warrant supports evolutionary order (Biology), logical order (Chemistry), geometrical order (Astronomy), etc., eleven in all.[1]

To find order and establish purpose in this variety Holstrom was led to classify the systems,[2] indicating that no single solution exists.

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1. Vickery (p. 30) Lists:
   (1) Logical - from the complex to the simplest,
   (2) Geometrical - according to the position of things in space,
   (3) Chronological - according to position in time,
   (4) Genetic - according to likeness in origin,
   (5) Historical - a combination of many of the preceding characteristics,
   (6) Evolutionary - from simple to complex,
   (7) Dynamic - order of power,
   (8) Alphabetical
   (9) Mathematical - order by means of a notation,
   (10) Decreasing extension
   (11) Increasing concreteness

2. J.E. Holstrom, Classification of Classifications, F.I.D. 17th conference report, vol. 1, 1947, p. 29-36 as quoted by Vickery, p. 17.

The order of specification knowledge does not require such diversity. It can take advantage of its limited field, its limited inter-relationship, the limited number of criteria necessary to identify concepts, in short, a large workshop with a host of instruments is put at the disposal of the architect by the librarian for the production of a comparatively simple tool.

In the process of this study theoretical precepts applicable to the organization of specification source material have been selected from this multitude. This stock formed the basis for a number of trials and failures until, through gradual elimination of "loose ends" a gridiron pattern emerged, which satisfied the requirements. The validity of its theoretical components was then verified against conventions pertaining to knowledge classification.

Architectural schemes occasionally refer to the simplicity of their use. While such reference may be seemingly true at the time of their publication, "simplicity" is often the result of mere generalization, inadvertently twisted interrelationships, or misclassification to fit a basically arbitrary pattern. An array of stock terms is considered "simple" if it can be divided and subdivided by a rule of thumb, on the assertion that it will be also used by a rule of thumb.

Actually an inconsistent classification is as hopelessly complicated as a warped structure. Additions no longer fit into the once established pattern, its usefulness becomes questionable, and its makers, frustrated by its inaccuracies, lose interest in it.

If a field is complicated it should be so presented. Intricacies can be analysed. A true pattern can be laid out, and then,

after the true pattern is recognized, ways of genuine simplification will also be recognizable. Such simplifications are always impending where requirements on a scheme are limited as in the case of the order of specification source material, which merely serves to facilitate the writing of architectural specifications.

It was found that "Material" was the main factor in architectural specifications, that "Works" in many variations rather than forming a separate entity, were linked to it, and that works not associated with materials belonged to other groups (e.g. Maintenance).

As Vickery's complicated nominalistic treatment copes with the requirements of an array of practically indefinite complexity, conceptual order embracing and relating Material Use, Material Substance, Alternate Materials, Material Design, Material Fabrication, has been found sufficient for the comparatively modest purpose intended.

Vickery, at the end of his treatise, provides a general confirmation of the material concept in technology, as proposed in this present study:

> From all these examples it should be clear that the notion of "substance" - though the use of the term may be unfamiliar to some - is quite straightforward, once it has been explained, at any rate in the field of Science and Technology.[1]

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1. Ibid., p. 177.

CHAPTER II

DEVELOPMENT OF BASIC CRITERIA.

THE NEGLIGIBILITY OF THE PROBLEM AT ITS EARLY STAGES.

A few examples[1] spanning a century illustrate the early need for reference, the idea of its repeat use, its growing complexity, and growing pains regarding its form of expression:

1839 "Base 12 inches including mouldings, not inferior to Dan'l Smith's House on Fifth Street".

1896 A master-copy by W. Frank Brown lists three architectural trade sections: Mason's, Carpenter's, and Painter's Specifications.

1914 A critic states that "The traditional specification appears as a document originating in a law office, its real meat obscured in a tangle of legal safeguards - justifiable if they were necessary to the fulfillment of the Contractor's obligations, but they are not".

1926 Publication of "Ready Written Specifications, a Compendium of Clauses for Direct Use in Architectural Specifications", a master-copy listing 17 architectural trade sections.[2]

1939 Streamlining Technique devised by Horace W. Peaslee, promoting telegram style specification language.[3]

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1. Ben John Small, Streamlined Specification Standards, Vol. 1, New York, Reinhold Publishing Corp., 1952.
The first three examples are condensed from the Preface.

2. Holland and Parker, Ready Written Specifications, New York, John Wiley & Sons, 1926.

3. Small, Preface.

1940 Reeve-Sleeper's Architectural Specifications list 57 architectural sections.[4]

While this list cannot be complete, it provides certain clues. If the number of trade sections listed is supplemented with current section indexes and plotted against a time sequence, a parabolic curve results pointing at an infinite number of sections for the near future.[5]

The term "section" originates from the term "trade section", which meant "Carpenter's Work", "Mason's Work", "Painter's Work", etc. Prefabrication of Building Components has created specification sections, to which the term "trade" no longer applies. The manufacturer and the mechanic in perpetuation of the industrialization, now substitute the tradesmen in increasing proportion. Hence a "Section" can be devised for any fabrication and installation processes, the number of which, for all practical purposes is "infinite".

In a given period of time new specification source material exceeds the amount of obsolete specification material. The total, being in constant fluxion, can no longer be compiled and maintained by individual effort. The technique of the traditional one-author master copy, which is evidently limited to one hundred sections, can therefore no longer cope with the requirements it is now expected to satisfy.

Filing systems and standards collections have not been developed to fill the void. Together with the master copies available, they represent bulk literature that has to be scanned and co-ordinated by the specification writer. Increased accessibility would obviously reduce that effort.

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4. Ibid., Index.
5. Figure 1.

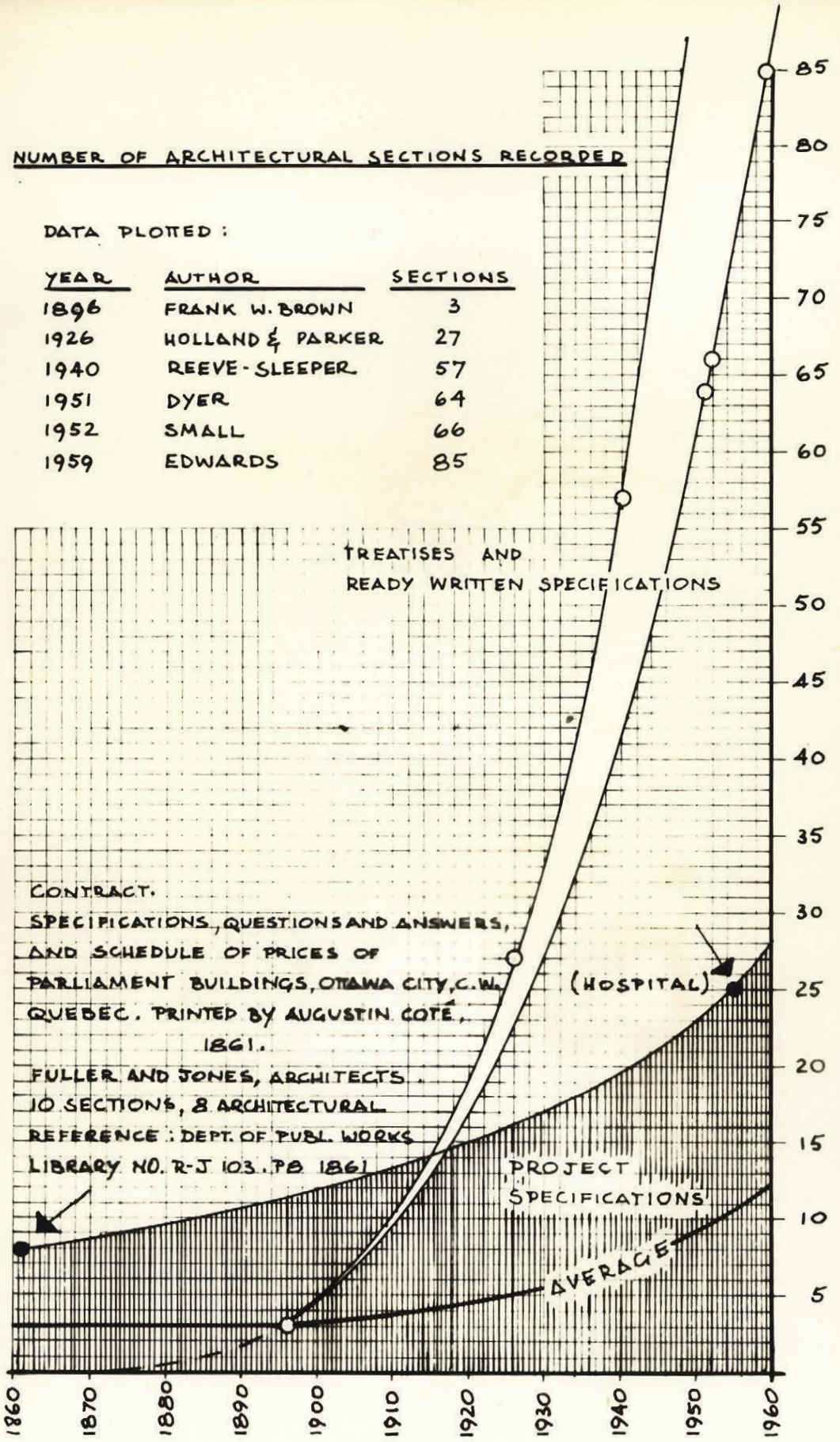

FIGURE 1

SECTIONAL DIVISION OF SPECIFICATIONS 1860 - 1960

Tabulated organization of knowledge ranges from the ancient Assyrian tables in the library of Assur-ban-i-pal, showing a division of matters pertaining to Earth, and matters pertaining to Heavens, to the intricacies of present library systems.

From its simple origin, knowledge classification has developed into three broad categories according to purpose and procedure:

1. Logical,
2. Philosophical,
3. Scientific.

Logical classification, an example of which is the dichotomous series often called the "Tree of Porphyry", or "Tree of Ramus" may be stated to be a mere exercise in logic. It is basically a sequence of distinctions of what a thing is and hence, what it is not, ultimately leading from the most general to the most specific:

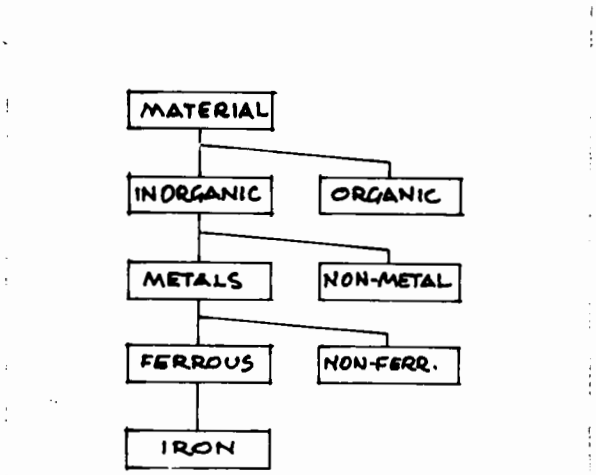

FIGURE 2

GRAPHIC EXAMPLE OF LOGICAL CLASSIFICATION.

Philosophical Classification could be defined as an attempt to communicate a mental ideal order of the universe, laid out before its maker began to put details into it. A classic example of this category is the Stoic Triad showing the order of views represented by Plato, Aristotle and Socrates, which persist in modern schools of philosophy, and in which the applied sciences, the technologies and the arts have their dependent places:

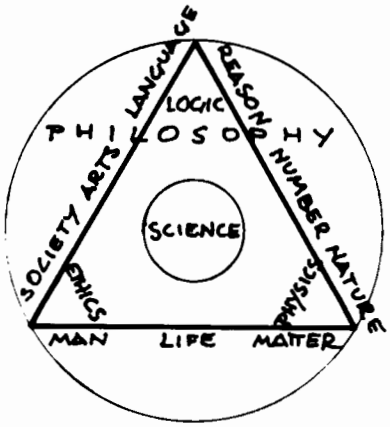

FIGURE 3

GRAPHIC EXAMPLE OF PHILOSOPHICAL CLASSIFICATION.[1]

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1. Henry Evelyn Bliss, The Organization of Knowledge, New York, Harry Holt & Comp., 1929, p. 402.

Scientific Classification seeks to formulate a scheme of mutually exclusive and exhaustive categories based on the most important characteristics of the things concerned and the relationships between them. Modern classification systems designed for practical application although retaining philosophical relations in the division of their main classes, are based on that principle:

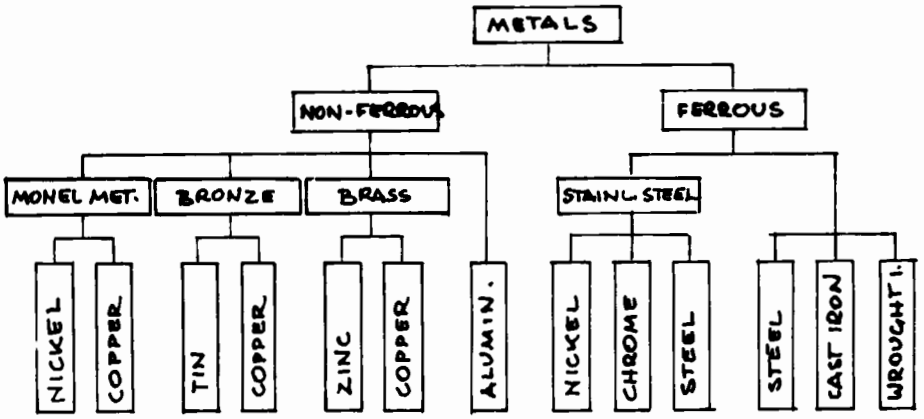

FIGURE 4

GRAPHIC EXAMPLE OF SCIENTIFIC CLASSIFICATION.[1]

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1. The example also illustrates some of the difficulties encountered in this type of enumeration: note repeated listing of copper and the necessary reference to nickel and chrome under Ferrous Metals.

In schemes with an acknowledged philosophical basis Architecture appears to be first recognized in 1767 by D'Alembert in an elaboration of the Baconian System:

BACON:	Class I	History	(Memory)
	Class II	Philosophy	(Reason)
	Class III	Poetry	(Imagination)
D'ALEMBERT:		1. Narrative Poetry 2. Dramatic Poetry 3. Allegorical Poetry 4. Music, Painting, Sculpture Architecture, Engraving.	

TABLE I

SELECTION FROM THE BACONIAN SYSTEM.[1]

Architecture subsequently takes its place under various headings: Renauld Warin (1798) classifies Architecture under Poetry; Girault (1807) under Natural History; Lord Lindsay (1845) under Poetry; Dr. W.D. Wilson (1856) under Productive Sciences.

In schemes without an acknowledged philosophical basis (i.e. book arrangements), Architecture takes its place under Fine Arts (Ersch, 1793), and Liberal Arts (Imperial Library of St. Petersburgh, 1808).

Melville Dewey (1876) first separates Building (Useful Arts) from Architecture (Fine Arts). It is a separation of building trades and materials from building types and parts.

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1. Original Form (1623): Fr. Baconi, Partito Universalis doctrinae humanae; D'Alembert, Discours préliminaire à l'Encyclopédie Méthodique, quoted in Berwick W. C. Sayers, Manual of Classification, London, Grafton & Co., 1955, Table I, p. 88.

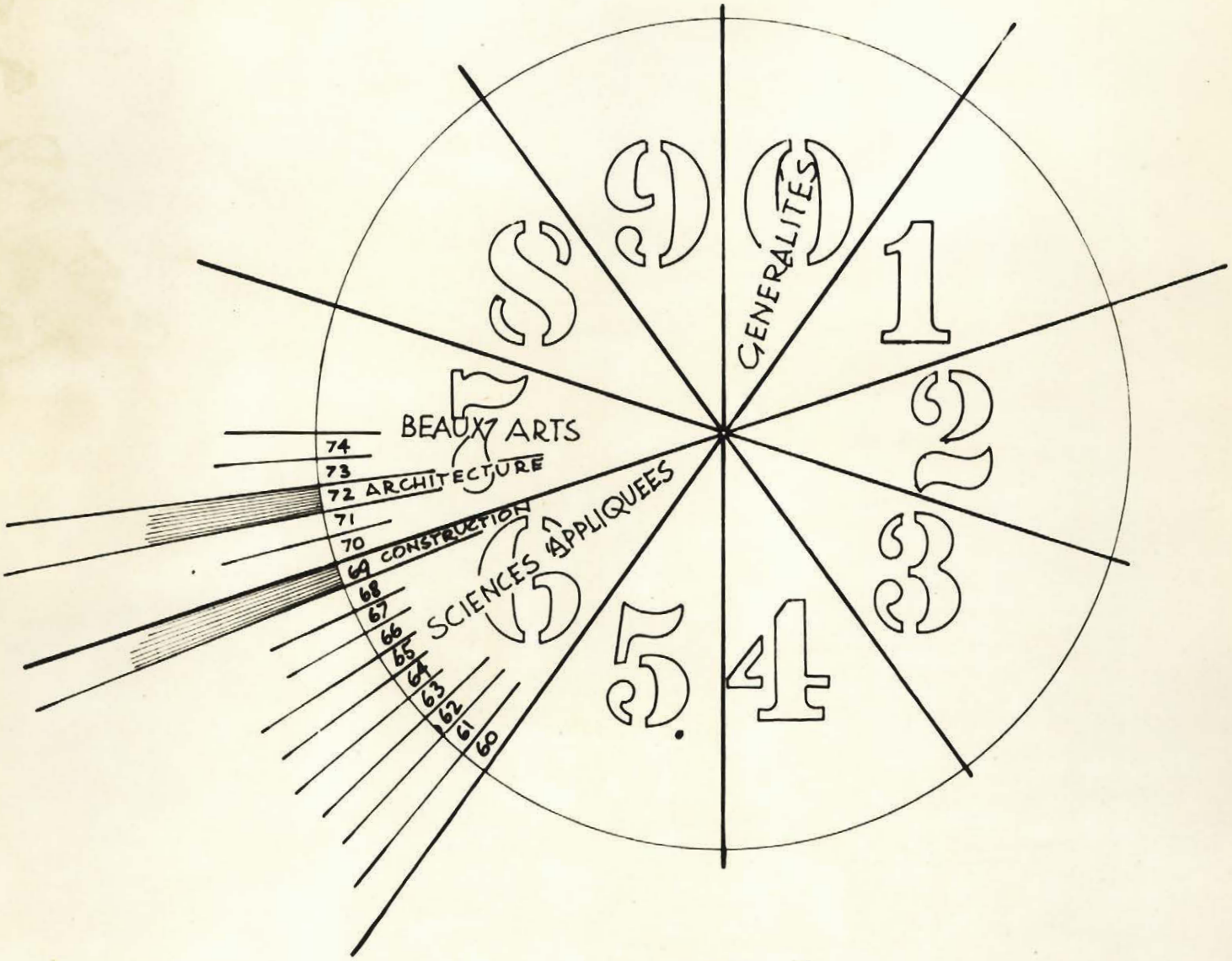

FIGURE 5

PARTIAL REPRODUCTION:

DIAGRAM OF DECIMAL CLASSIFICATION, SHOWING HOW THE CLASSES DIVIDE AND SUBDIVIDE. COPIED, WITH PERMISSION, FROM THE MANUEL DE LA BIBLIOTHÈQUE, BY P. OTLET AND L. WOUTERS, BRUSSELS, 1923.

QUOTED BY W.C. BERWICK SAYERS, A MANUAL OF CLASSIFICATION, GRAFTON & CO., 1955, LONDON.

Melvil Dewey, Decimal Classification (First Edition, 1876).

690 BUILDING
691 Materials, Processes, Preservatives.

.1 Wood, Creosoting, etc.
.2 Natural Stone, Parafining, etc.
.3 Artificial Stone, Concrete.
.4 Bricks, Tiles, Other Ceramic Products.
.5 Lime, Cement, Plaster.
.6 Glass.
.7 Iron, Steel, Anti-rust Processes.
.8 Other Metals.
.9 Other Materials.

692 Plans, Specifications, etc.

693 Masonry, Plastering, Fire Proofing.

.1 Stone Construction.
.2 Brick Construction.
.3 Terra Cotta Construction.
.4 Hollow Tile and Porous Terra Construction.
.5 Concrete and Beton Construction.
.6 Plastering.
.7
.8 Fire Proofing.
.9

694 Carpentry, Joinery, Stair Building.

.1 Wood Construction, General.
.2 Joints of Woodwork, Framing.
.3 Strengthened Beams.
.4 Posts, Columns.
.5 Pnelled and Latticed Construction.
.6 Joinery, General.
.7 Stair Building.
.8
.9 Other Branches.

695 Roofing, Slating, Tiling.

.1 Shingle.
.2 Slate.
.3 Tile.
.4 Metal, Tin, Copper, Lead, Zinc.
.5 Iron.
.6 Asphalt, Tar, Concrete (melted).
.7 Felt Asbestos Paper (in rolls).
.8 Textile, Duck, Canvas.
.9 Thatch and Other Coverings.

696 Plumbing, Gas and Steam Fitting.

697 Heating and Ventilating.

698 Painting, Glazing, Paper Hanging.

.1 Painting Oil.
.2 Distemper and Fresco.
.3 Varnishing, Polishing.
.4 Other Modes of Protection.
.5 Glazing.
.6 Paper Hanging.
.7 Textile Hangings, Tapestry.
.8 Relict Work, Lincrusta, Stamped Leather, etc.
.9 Other Branches.

699 Car and Ship Building.

720 ARCHITECTURE

721 Architectural Construction.

.1 Foundations.
.2 Walls.
.3 Piers.
.4 Arched Constructions.
.5 Roofs.
.6 Floors and Flooring.
.7 Ceilings.
.8 Doors, Gates, Grilles, Windows.
.9 Iron and Composite Structures.

TABLE II

SELECTION FROM DEWEY'S DECIMAL CLASSIFICATION.[1]

A nucleus for the organization of specification source material had thus been provided for.

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1. Melville Dewey, Decimal Classification and Relative Index, Boston, Library Bureau, 1876.

An increase in knowledge enlarges its organizational pattern. Branches or groups form, as specialized fields are recognized and their relationships to other branches or groups within the host concept are established.

In 1876 Dewey formulated a concept which was suitable for the organization of specification source material. Contemporary specification writing was in its infancy. Twenty years after publication of the Dewey system appeared the first recorded master-copy system which contained only three architectural trade sections as compared to the four recognizable in Dewey's schedule:

Dewey (1876)	Frank W. Brown (1896)
Masonry	Mason
Carpentry	Carpenter
Roofing	Painter
Painting and Glazing	

Disregarding this technical variation, the two ensuing systems, the analytical as practiced by librarians and the synthetical as practiced by architects, have here their common point of departure.

The two methods of compilation through their different respective end purposes, bring about two structures of differing appearance: to the librarian the desired end-product are the particulars; to the architect it is their combination. Librarian knowledge classification "divides" into hierarchies, architectural knowledge classification "combines", enlarging trade sections.

At the time when both schedules were small, the differences was hardly relevant, in fact, through its direct applicability

to project work, the section grouping was the more practical method for architects. There was no merit in contemplating or even discovering consequences that might arise from growth sixty years hence, particularly as the direction of developments was unknown.

Today, the amount of source material applicable to a project is only a fraction of its total. At the turn of the century most of the contents of a master-copy applied. Since the relatively few contents of a master-copy and periodical additions thereto could almost be memorized, the problem of information disposal and retrieval was negligible.

However, the problem was soon to be recognized. The master-copy, basically a "ready written specification", was not designed to absorb the influx of source material without constant re-editing. In 1920 then, the American Institute of Architects initiated the Standard Filing System "to simplify this problem of filing and to provide a means of easily maintaining such a conveniently usable reference file".[1]

Two methods of classification were now in existence: the traditional (trade sectional) field-of-knowledge classification and the new filing system, a one-place-classification, which could have followed Dewey's lead, but failed to do so for reasons unknown.

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1. The American Institute of Architects, Standard Filing Systems and Alphabetical Index, Washington, AIA, 1959, p. 3.

THEORETICAL PRECEPTS OF KNOWLEDGE CLASSIFICATION.

Classification is the process of arranging individual objects into groups and combining these groups until a total is reached, which contains all objects thus grouped.

Division is the reverse process.

Both are referred to as "classification", which collects like things, separates unlike things and is the simplest method to detect, as Plato said, "the one in the many".

The process is basic to librarianship, specification writing, and other undertakings requiring organizational method.

Classification may be based on natural or artificial criteria. For instance, Sheet Metal can be classed as to its substance, its uses and its appearance:

Sheet Metal	Sheet Metal	Sheet Metal
Copper	for roofing	perforated
Steel	for flashing	expanded
Zinc	for dampproofing	flat
Aluminum	for utilities	corrugated

Substance is a fundamental distinguishing factor for sheet metal in that no treatment will change one material into the other; copper cannot be converted to steel. The grouping of objects into a series of individual classes according to their fundamental likeness or unlikeness is therefore known as "natural classification".

Use or appearance are subject to treatment. The same type of sheet metal may be used for roofing or for dampproofing. A flat sheet may be expanded or corrugated. The mere change of use

or treatment may classify the object under another group. The grouping of objects into a series of individual classes according to criteria accidental to their fundamental likeness or unlikeness is therefore known as "artificial classification".

"Five Predictables" have been advanced by the Greek logician Porphyry[1] as qualitative measurements in natural and artificial classification:

1. Genus - A series of objects which can be divided into groups.
2. Species - A group, several of which the genus is composed.
3. Difference - The quality added to the genus to form the species.
4. Property - A quality common to every member of the genus.
5. Accident - A quality which may or may not be possessed by any member of the genus.

Example:

Genus - Sheet metal

Species - Copper

Difference - Substance

Property - Waterproof (all sheet metals are waterproof, but waterproofing qualities can also be the property of other materials).

Accident - Corrugated (it may be corrugated, but need not be).

In addition the term "summum genus" is used to combine genera.

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1. Howard Phillips, A Primer of Book Classification, London, Association of Assistant Librarians, 1955.

In establishing a "hierarchy"

(a) each step must be based upon a single principle of division,
(b) co-ordinate classes must be mutually exclusive,
(c) co-ordinate classes must be collectively exhaustive, i.e. co-extensive with the summum genus and
(d) schedules must be flexible;[1]

which means

(a) that the characteristics must be used consistently at each level of the division:

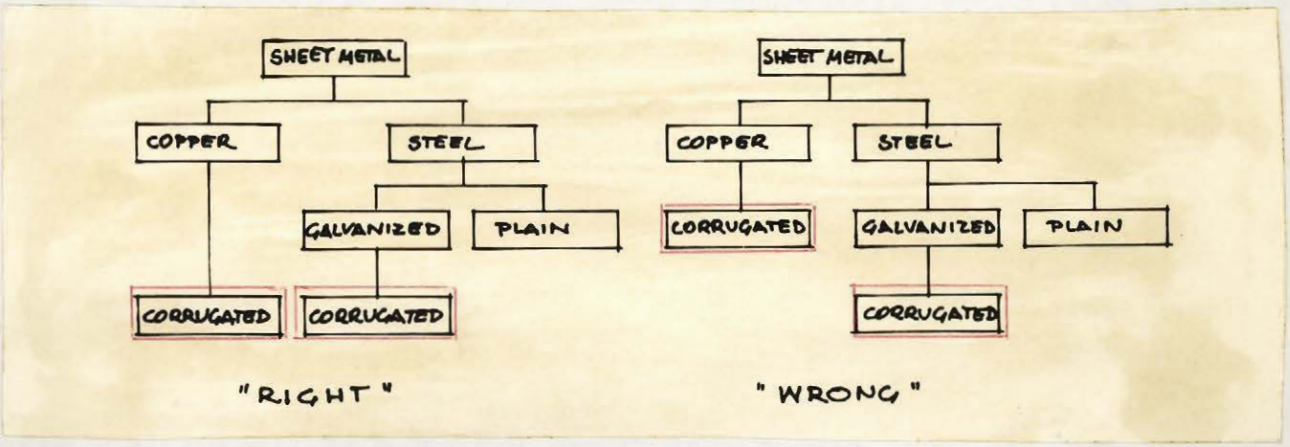

FIGURE 6

CONSISTENT AND INCONSISTENT PRINCIPLE OF DIVISION.

(b) that co-ordinate classes are equal in rank. A breach of the first rule involves of necessity a breach of the second, as shown. Consistent and inconsistent classification catalogued will appear thus:

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1. Phillips, Ibid., p. 16-21 and Sayers, Ibid., p. 41-44.

Consistent:

Sheet Metal
1. Copper
2. Steel
   (a) galvanized
      (i) corrugated
      (ii) flat
   (b) plain
3. Aluminum

Inconsistent:

Sheet Metal
1. Roofing
2. Siding
3. Copper
4. Aluminum
5. Perforated
6. Expanded
7. Galvanized

(c) that the sum of species should equal the genus and the sum of genera should equal the summum genus. Hence no species should be listed under a foreign genus.

Wrong:

X. Sheet Metal

1. Copper
2. Steel
   (a) galvanized
3. Aluminum

Y. Architectural Metals

1. Copper
   (a) bars and plates
   (b) sheets and strips

(d) that schedules must be designed to absorb an increasing fund of knowledge and lend themselves to omissions and revisions without sacrifice of their efficiency.

The summum genus represents a concept of large extent but small intent, while the species represent concepts of small extent, but large intent: "Material" at the head of a schedule embraces a multitude of unspecified things, a "two-inch common steel wire nail" at the bottom of the schedule represents a specific item. While division near the bottom of the schedule is a scientific process, classification at the head of the table usually entails the employment of philosophical views. A division of "two-inch common steel wire nails" in "galvanized" and "cement coated" is a mere matter of recording facts. The sensible division of "Materials and Methods" requires a concept, which scientific systems hesitate to

adopt, unless it is scientific in itself.

The challenge to approach the ultimate order has lead to three schools of philosophical thought:

To the Realists, the common property of all things, real or unreal, is their universality. Things are; in different places, at different times, in different actions or conditions. Plato held that this essence, antecedent to the embodiments of the individual things, is "real" and universal.

The Nominalists asserted that it is only the name which is common to the things classed by it.

The Conceptualists have held that everything is subject to a concept, which is neither name nor thing, but relation.

This vagueness is foreign to scientific classification. Between both there can be found a zone of transition. Most current classification systems begin with an assumed order of a given number of fields of knowledge, which is no longer critical and dependent merely on the desired coverage. Phillips states that the ideal library system would be a collection of systems specifically tailored to the demands of each field of knowledge, and that "it does not really matter in what order within reason the main classes follow one another".[1]

The specification master-copy (or Ready Written Specifications) is essentially such a system. It is a collection of sections,

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1. Ibid., p. 33.

each of which constitutes a "system specifically tailored to the demands of each field of knowledge".

The treatment of the fields of knowledge follows two similar, but not identical lines: knowledge classification and book classification. The difference between the two lies in their respective purposes.

Knowledge classification aims at collecting things together that belong together. It is abstract. Book classification aims at collecting things together that are used together. It is concrete.

A "Typical Specification for Schools" would correspond to the first, a collection of project specifications for various schools would correspond to the second definition.

Interrelation between fields of knowledge create facet duplication. Tar is a product used in highway engineering, building construction, chemical engineering, in horticulture and veterinary medicine. A change of the concept of tar would affect each field of knowledge individually. Similarly, where the definition of one building product subject to multiple application is changed (e.g. through standardization), such change would have to be carried out consistently throughout a master-copy. Multiple corrections however, are known to be a source of oversights.

To cope with this problem, the "One-Place Classification", which would eliminate such errors, is considered ideal from the administrative viewpoint. Filing systems are based on that principle.

Negligibility of philosophical classification has led to the question to which degree the hierarchy is still valid as a pattern along which lines to classify. "Synthetic" schemes as opposed to the "enumerative" tree of knowledge were developed.

The enumerative scheme attempts to divide and subdivide until a ready-made number is available for almost every specific topic.

The synthetic scheme provides a series of basic schedules, the items of which may be combined to produce a "built-up" number for any specific topic.

It is doubtful whether any universal scheme, enumerative or synthetic, will satisfy specialized fields in which the presentation of its structure requires as much emphasis as its contents.

As classification proceeds from the general to the particular, the pattern of organization within the groups to be classed changes. It may therefore be concluded that that pattern of organization is the most successful, that most closely corresponds to the relevancies of the group of objects classed by it, and that the prime objective of special knowledge classification must be to discover just what pattern is inherent in, and can be abstracted from, that particular field.

A number of schemes has been developed to lay out that zone of transition between purely philosophical and purely scientifical classification. There are three basic procedures recognizable: firstly, one by which the contents are laid out first and to which a notation system is then applied; secondly, one by which a notation system is laid out first, into which content matter is

placed; thirdly, one by which entries are given independent notations, the total of which fall into place under a system of concept categories. The following enumeration attempts a brief description of current library schemes in the above order.

The Library of Congress Classification[1] is a scheme grown out of the assembly of a few volumes on shelves. It was established in 1800 in Washington to serve the now biggest library in the world. Its purpose is purely practical and may be termed a One-Library system designed to accommodate the collection of volumes, plates and clippings of the Library of Congress. The scheme makes no claim for universality beyond its own measure and its structure is geared to that of a US library to an extent that would make it unsuitable as a scheme for instance in a country with a different system of government.

The alphabetical outline of the main classes is purely arbitrary. Its great strength results from its intensive maintenance. The schedules provide for the most minute grouping of subjects, they have been worked out by specialists, are kept up-to-date and are being published separately, complete in themselves.

Cutter's (1837-1903) Expansive Classification[2] consists of seven separate classifications, each scheme a development of the foregoing, but of progressive complexity. It is based on the idea,

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1. Library of US Congress, Classification, Washington, US Government Printing Office.

2. Charles Ammi Cutter, Expansive Classification, Boston, Cutter, 1891-1893.

that as the stock of a library expands, the outgrown classification will be abandoned and the next one will be adopted. It gets the name "expansive" from that adaptability. Most critics have praised the scheme from a librarian point of view.

Bliss' System of Bibliographic Classification[1] has been in use since 1902, but the publication of the full schedules took over fifty years to complete. Apart from the schedules of the main classes there were originally nine tables, called Systematic Auxiliary Schedules, each representing a different point of view (e.g. countries, language, form, time, race). These have been expanded to twenty-two main tables in 1953 and with complimentary and supplementary schedules, the full list now totals no less than forty-six.

The Decimal Classification formulated by Melvil Dewey (1851-1931) is an attempt to formulate a scheme "of the greatest possible simplicity", by dividing the whole of human knowledge into ten groups, dividing each afresh by the addition of more decimal places and so on. Arabic numerals used as classification symbols permit the intercalation of new subdivisions at any point.

The Decimal Classification is an enumerative type with a preconceived but flexible number of divisions and sub-divisions.

Probably the greatest factor attending its success is the ease with which it can be modified to suit individual needs.

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1. Henry Evelyn Bliss, A Bibliographic Classification, New York, The H.W. Wilson Comp., 1940.

The Universal Decimal Classification is an elaboration and adjustment of the Dewey Decimal Classification. In 1895 the International Federation for Documentation examined existing schemes and resolved to use the Dewey classification as the basis of the subject index, because

1. It was one of topics.
2. It had an internationally understood notation.
3. The decimal principle allowed indefinite intercalation.

The UDC is of importance not only for the way in which it avoids the inflexibilities of the Decimal Classification and improves its terminology, but primarily as a scheme for the treatment of masses of specialized material in large and small libraries.

The Abridged Building Classification (ABC)[1] is a selection from the Universal Decimal Classification (UDC). The original schedule has been suppressed in parts but retained in others as to conform to the pattern of interest to architects, builders and civil engineers. The ABC thus is an attempt to approach congruity to the broad field from which architectural specification source material could be drawn. It is sufficiently comprehensive, ideologically divided, and balanced.

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1. Abridged Building Classification, A Selection from the Universal Decimal Classification by International Building Classification Committee, second edition, The Section Documentation of the International Council for Building Research, Studies and Documentation, Bowcentrum, Rotterdam, 1955.

The sections of particular interest are

62 Engineering
66-68 Industries and Manufactures
69 Building
71 Physical Planning
72 Architecture,

which divide the complex "Materials and Works" according to the following concepts:

62 Engineering refers to preparatory outside work; excavations, piling, rough grading, and roadwork.

66-68 Industries and Manufactures refers to products and their fabrication.

69 Building, deals with the edifice apart from outside work, and with its parts.

71 Physical Planning contains final outside work, e.g. landscaping.

72 Architecture is essentially a list of building types.

Unfortunately, the key section, Building, appears to be a result of compromise. As a whole it reflects chronological order, but thus places mechanical trades in between the architectural trades, a process by which Painting, Glazing, Paper Hanging and the Proofing entries are separated from Building Construction and Execution of Work:

69 BUILDING (Skeleton schedule)

.02 Building Elements.
.03 Construction under Special Conditions. Permanence.
.05 Site Organization. Plant. Location.
.059 Maintenance, Damage, Reconstruction.

691 Building Materials and Components.
693/4 Building Construction, Execution of Work.
696 Equipment, Services, Installation in Buildings.
697 Heating, Ventilating and Airconditioning of Buildings.
698 Painting, Glazing, Paperhanging.
699.8 Proofing, Insulated and Protective Construction.

TABLE III

SELECTION FROM THE ABRIDGED BUILDING CLASSIFICATION.

Since Painting, etc., is subordinate (not co-ordinate as shown) to Building Construction and Execution of Works, the table in this instant, is inconsistent according to the criteria of knowledge classification.

But in detail it answers hereto awkward questions such as "under what theory can Building maintenance (69.059), Contractor's plant (69.05), Construction in cold weather (69.03), Testing (620.1), Roadwork (625.7), Vegetation (712.4), Detached secondary structures (712.6), etc., be fitted into a general specification pattern?"

ABC numbers permit mutation, and where a detail is missing, mutation is still possible by the use of the next higher class. For instance Wallpaper is listed under Materials, but Linoleum is not. However, Linoleum Flooring appears under the next higher class Building Elements.

The following are titles of recent standard specifications issued by the Specification Writers Association of Canada, chosen to test the comprehensiveness and workability of the ABC:

LINOLEUM ON SUSPENDED CONCRETE FLOORS

69.025.335	:	69.025.22
Cork and Linoleum Floorings	(on)	Suspended Concrete Floors

MAGNESIUM OXYCHLORIDE CEMENT FLOORS

69.025.331.1	:	69.025.2
Magnesite Flooring	(on)	Suspended Floors

FERROUS METALLIC WATERPROOFING

699.82	:	69.022.2 / 69.025.1
Waterproof Construction	(on)	Basement Walls / Floors on Ground

Considering that the ABC and the Standard Specifications were developed independently, the mutation system, as a supplement to direct classification, can be termed successful.

The Subject Classification[1] was devised 1906 by James Duff Brown in an attempt to approach a One-Place classification. Brown conceived that Material is universal and that any human activity involves two things: material and purpose. It is the combination of the two that makes the "Subject".

In classing material first, Brown reverses the traditional concept, in which the concrete is made sub-ordinate to the abstract.

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1. James Duff Brown, Subject Classification, London, Grafton & Co., 1914.

Example:

Material: Railways

Purpose: Railway Economics,
Railway Transport,
Railway Engineering.

The practical defects of this classification are due to the individuality of the system, which, as the author states, "for reasons weak or strong can be advanced", and the attempt to incorporate a one-place classification into an enumerative scheme.

The Colon Classification devised by Ranganathan (1939) can be seen to stand at the farthest possible point from the Library of Congress Classification which sets out to enumerate every subject that has arisen in lineal form, i.e., through perpetual division. The Congress Classification typifies the enumerative scheme. The Colon Classification is the prototype of the analytico-synthetic scheme.

Although the system represents a distinct deviation from the design of others, it contains certain established mechanics.

The trivium employed is of traditional canonical character: Sciences; Humanities, proper; Humanities, social sciences.

Classification resembles that of the Subject System:

"F. Technology"

"F01 - The two characteristics forming the basis of classification of Technology are to be taken in the order "S", "P"."

"F02 - The number corresponding to these characteristics may be termed the Substance Number and the Problem Number or the Process Number, as the case may be, respectively."[1]

Division follows the Decimal System:

"Divisions based on Material or M Characteristics:

1 Wood
2 -
3 Marble
4 Stone
5 Bronze
6 Other Metals
7 Terra Cotta
8 Ivory
9 Other Materials".

However, it differs from the Decimal Classification in that it provides standard unit schedules, which through combination of their numbers form new "built-up" numbers of the desired topic designation:

Table I	Table II	Table III	Topic:
Z Law	3 Great Britain	K Encyclopedia	Z:3:k Encyclopedia of the Laws of Great Britain

In this scheme, the function of the colon is to separate and relate symbols. The linking of concepts through the use of the colon is also a method employed in the Decimal Classification. The difference is that the Colon system mutates numbers from several tables, while the CDU mutates numbers from itself.

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1. Shiyali Ramarita Ranganathan, Colon Classification, Madras. The Madras Library Association, 1933.

Apart from the difference in procedure and individual approach, all schemes abide of necessity by the ancient rules discovered by Plato and Porphyry, which they elaborate, but cannot part from.

It is therefore possible to summarize, as Sayers suggests:

> What we expect in a classification is that it will work. This it will do as long as it is
>
> 1. Comprehensive,
> 2. In a consistent and recognizable order,
> 3. Is as minute a statement of things as humanly possible,
> 4. Is flexible enough to keep abreast of the changes in thought and in literature which is its reflection,
> 5. Has a simple notation which is also flexible and
> 6. A full index.[1]

CURRENT ORGANIZATION OF SPECIFICATION SOURCE MATERIAL.

Goldsmith's Architectural Specifications[2]

The project specification for the small to medium job is the topic for this primer for students of specification writing. The variety in extent and type of construction reflected in project specifications constitutes an independent variable in the formulation of a general scheme, which the author attempts to cope with in two ways:

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1. Ibid., p. 88.
2. Goldwin Goldsmith, Architects' Specifications - How To Write Them, Washington, The American Institute of Architects, 1959.

1. by devising an expansive system in form of two schedules, and

2. by grouping related sections in chronological sequence,

i.e. in the order of the appearance of the trades on the work.[1]

According to the author, trades are allied through "Relation of Materials", or "Relation of Installation", or by "Custom".

> All masonry trades, brick, tile, stone, concrete, etc., are related because of the character of the material.
>
> Dissimilar trades such as composition roofing and sheet metal work are related trades because of the interrelation of the work of installation, that is, their use in a joint operation.[2]

Subject grouping by custom may be scheduled as follows:

Under Masonry Work: Steel and Iron Work, Lathing and Plastering.

Under Carpentry : Roofing and Sheet Metal, Painting and Finishing.

But this classification is uncertain. Goldsmith states that:

> Sometimes, however, Roofing and Sheet Metal Work will be classed with Masonry because Waterproofing is so classed and the type of roofing specified may indicate that the two should be grouped together.[3]

Discussing the main groups Masonry and Carpentry, Goldsmith argues as follows:

> The trade titles through 10 are directly related as masonry trades. Item 11 is related to some of the masonry items, and 12 is closely related to 11, so that they belong in the masonry group. Items 13 through 17 are usually related to masonry construction, whether wall bearing or skeleton framing. Items 18 and 19 are also related to masonry except in frame buildings, in which they would change position and be joined with the carpentry group. Items 20, 21, and 22 are also related to masonry, so that 1 through 22 may be considered the masonry group.[4]

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1. Ibid., p. 23.
2. Ibid., p. 20.
3. Ibid., p. 25.
4. Ibid., p. 119.

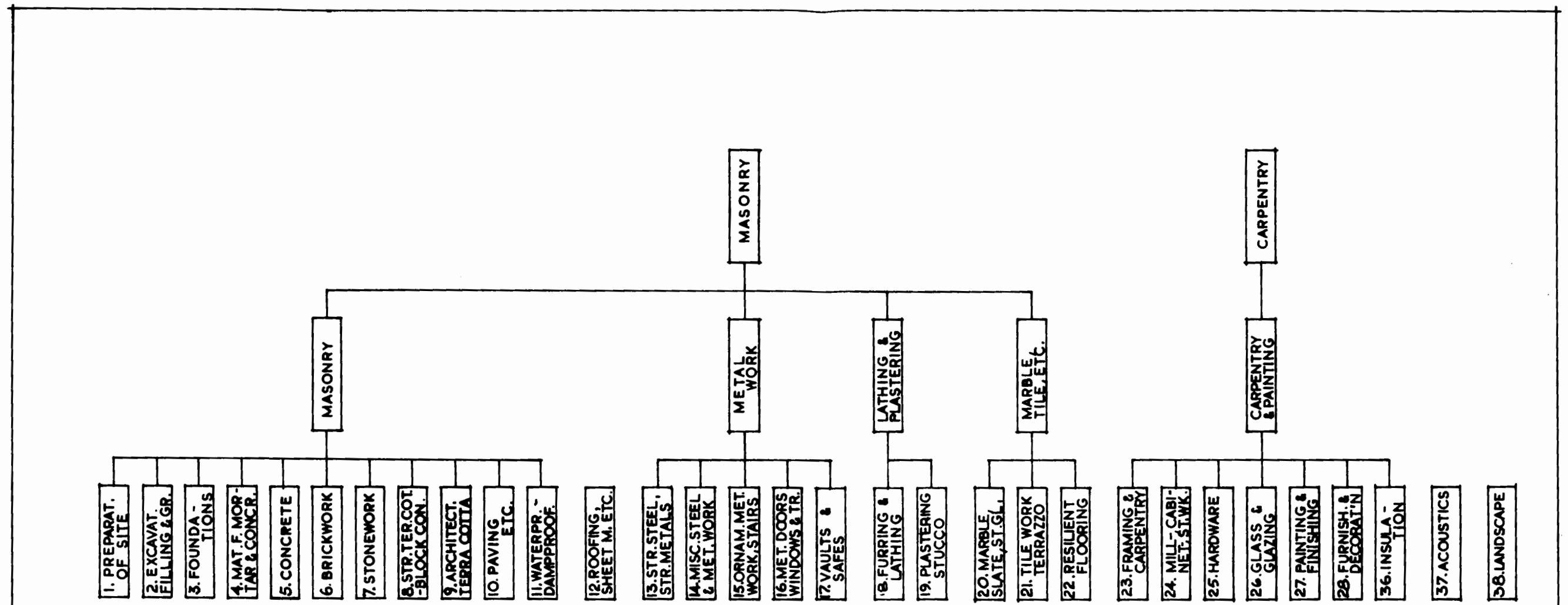

FIGURE 7

SECTIONAL DIVISION ACCORDING TO GOLDSMITH

To the three relationships "material", "installation" and "custom" have been added "directly related", "closely related", "usually related", "also related", and "related to some". The vagueness of this relationship together with the forced grouping under which industries are sub-ordinated under trades (e.g. metal industry under masonry trade) fails to contribute to the solution of the problem. The Author agrees, that

> in this sectioning and subdividing and grouping there is great difficulty in arriving at a definite and wholly satisfactory system.[1] . . . . . It would be ideal for the indexing system if it were possible to devise a completely divided schedule with a section for each possible trade, organized in such order that related or allied trades could be bracketed under major headings (or omitted when not required) without any changes in their positions in the list. This, however, does not seem possible. Each building must be considered separately on the basis of its particular type of construction.[2]

Edwards' Specifications[3] are an introduction to specification writing. The text provides a small schedule for small jobs and a large schedule of one hundred sections in twelve groups for large jobs. Under "Arrangement of Sections" Edwards states, that

> a. The sections of a set of specifications should be arranged in a logical order. The customary sequence is based on an attempt to parallel the chronological development of the actual construction process.
>
> b. The sections seem to fall into related groups.[4]

Analysis of the groups shows that the relationships they comprise are not uniform:

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1. Ibid., p. 23.
2. Ibid., p. 25.
3. H. Griffith Edwards, Specifications, Princeton, N.J., D. Van Nostrand, 1959.
4. Ibid., p. 24.

Work Prior to Construction is a chronological characteristic.

Concrete and Masonry are grouped by material relationship.

Waterproofing and Dampproofing bear relationship of installation.

Metal - a material relationship.

Wood and Hardware - relationship of installation.

Roofing - Relationship of material function.

Miscellaneous Work - Discussing this group, Edwards states that

> Sections covering architectural work not falling under a definite classification may be put into the specification at this point.[1]

Interior Finish - Relationship of material function.

Special Equipment - Combines equipment for special building types, for general buildings and for windows.

Final Outside Work is a chronological characteristic, corresponding to "Work Prior to Construction".

Conveyors - an equipment function.

The schedule suffers from this inconsistency of the division principle:

68. Radial Brick Chimney, a unit masonry construction of special design is classified under "Special Equipment",

66. Fire Escapes, of which there are two types, the metal stair type, which would fall under Metal Stairs (Metals), and the chute type, which would fall under Chutes (Conveyors), is classed as "Special Equipment".

57. Painting and Decorating, which includes Exterior Painting,[2] is classified under "Interior Finishes".

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1. Ibid., p. 25.

2. Ibid., p. 250-252.

Dyer's Specification Work Sheets[1] are "dummy sheets to be used for working up the rough specification draft for a specific job"[2]. The pad contains two schedules, one for which sections have been worked out, and one of possible trades that may occur on a job. The small schedule contains 36 architectural sections, the large 64 entries which include mechanical, electrical work, equipment, and final outside work.

Radial Brick Chimneys are here part of the Masonry Group. Hardware is regarded as a finishing item, as are Shades and Blinds. Metal Shelving is classed under "Metals", although a section for moveable equipment is provided under "Equipment". The term Moveable Equipment appears of doubtful value, as a division of Equipment into "Moveable" and "Stationary" is not otherwise reflected. Nor would such a division be relevant.

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1. Ben H. Dyer, Specification Work Sheets, Washington, The American Institute of Architects, 1951.

2. Ibid., p. 1.

Small's Streamlined Specification Standards[1] are intended to be a "comprehensive reference and a working manuscript which may be edited without disturbing continuity or form".[2] It derives its name from a technique devised by Horace W. Peaslee in 1939[3] which aims at reducing the wording of the text of a specification.

The classification within its two-tier structure is artificial. Two of the architectural group headings reflect material (fundamental) relationship, the remaining four reflect functional (accidental) relationship:

Site Work	(accidental)
Structural	(accidental)
Masonry	(fundamental)
Weather Protection	(accidental)
Metal Work	(fundamental)
Finishing	(accidental)

Because of the inconsistent principle of classification the groups are not mutually exclusive:

Masonry may be site work (paving, minor retaining walls),
structural (reinforced masonry lintels)
weather protection (masonry veneer)
and finishing (exposed interior brick, glazed brick).

Metal Work may be site work (fences),
structural,
weather protection (siding),
and finishing (curtain wall panels, counter tops).

The contents of each group are arranged in alphabetical hence not in logical, order: Precast Concrete Joists precede Precast Concrete Piling. Wood Piling follows Structural Steel.

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1. Ibid.
2. Ibid., Foreword by Carl J. Ebert.
3. Ibid., p. xii.

Reeve-Sleeper's Architectural Specifications[1] may be regarded as the most painstaking master-copy available. Because of their wide scope, even elaboration and clear organization, they may be regarded as a fair corss-section of the field at the time of their publication.

The author's aim was to methodically present a project specification of a utopian building which comprised the features of a total of buildings likely to be specified in a practicing office.

The compilation necessitated a consistent pattern of presentation, for which in conformity with contemporary tradition division (i.e. trade sections), sub-division, clause, sub-clause and paragraph were used. The Architectural Specifications thus are devised according to the principle of Field-of-Knowledge classification, and can be regarded as the exponent of the Master-Copy.

Because of its consistency and wide coverage it lends itself to direct analysis and provides an actual inventory of content matter of not too remote date.

The survey in Figure 8 shows that in 1955 content matter of a master copy was roughly divided in two, the one half being trade sections, the other being industry sections. In itself the term Trade Section (Reeve-Sleeper applies the uniform, but less distinct term Division to both types) lacks definition:

Roofing and Sheet Metal (Div.22) actually consists of 14 sections, Block and Tile (Div.11) of three, and Tile (Div.40) of two sections.

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1. Ibid.

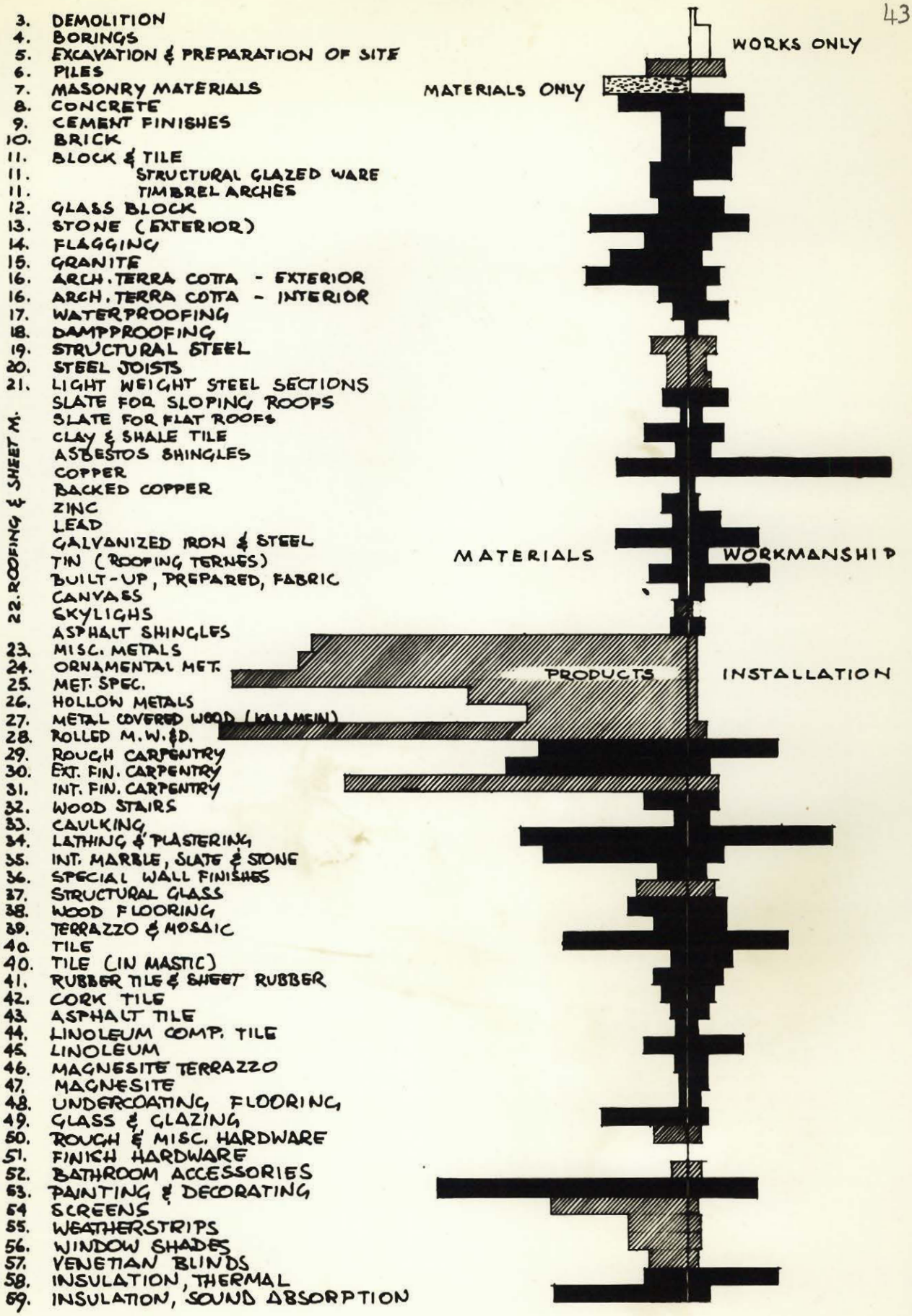

FIGURE 8

VOLUME SURVEY OF REEVE SLEEPER'S ARCHITECTURAL SPECIFICATIONS

Furthermore, the Roofing and Sheet Metal division contains specifications for chutes, an item that could well be separated from that trade which would then be limited to Roofing and Flashing. Nor is the difference between Miscellaneous Metals, Ornamental Metals, and Metal Specialities defined (The Architectural Metals Manufacturers Association[1] recommends division between Ferrous Metals and Non-Ferrous Metals). The division of Carpentry in Rough-, Exterior Finish-, and Interior Finish Carpentry is reminiscent of the era when trades dominated and shop fabrication was still considered a process of building rather than manufacturing. The break between Exterior Finish Carpentry and Interior Finish Carpentry thus occurs between Windows and Doors, a division according to location, which can no longer be considered relevant under the viewpoint, that both are manufactured products of the wood working industry, rather than the carpentry trade.

(The evaluation of Reeve-Sleeper's Architectural Specifications is concluded in Chapter V.)

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1. Earl P. Baker, Harold S. Langland, National Association of Architectural Metal Manufacturers, Architectural Metal Handbook, Washington, The Lakeside Press, 1952.

FILING SYSTEMS AND STANDARD COLLECTIONS

The main characteristic of filing systems and standard collections as compared to master copies, is their design as a One-Place Classification System.

The AIA Filing System[1] was initiated in 1920 to facilitate catalogue filing. It consists now of 41 Major Divisions, thirty of which are related to architectural specification source material.

> The inclusive "Major Division" classifications and file numbers are supplemented by sub-division classifications and file numbers referring particularly to individual types of materials, appliances, equipment, etc.
>
> While this principle has not been rigidly applied where it would conflict with simplicity or practicability, the classifications are, in general, based on "use" designations.[2]

Inclusiveness is claimed om the basis that the system includes a variety of professions. The necessary emphasis on Building has not been obtained through amplification of that field within a general pattern of professions, but by sub-ordination of the related professions under a minor branch of Building:

Law is classed subordinate to Codes, Standards and Construction Regulations.

The Purchase of Property is classed as Preparation of Site and Preliminary Work.

Town andCity Planning is sub-ordinate to Landscape Work.

This inverted relationship defeats a variety of primary and secondary purposes, the more obvious of which are true objectivity, true interrelation and true flexibility.

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1. Ibid.

2. Ibid., p. 3.

The arrangement of the Major Divisions is arbitrary. Foundations follow Brick Masonry. Structural Metals follow Roofing and Siding. Insulation appears between Construction Plant and Landscape Work.

There are three masonry divisions separated by other categories:
3. Masonry Materials contains cementitious materials and brick.
5. Brick Masonry contains unit masonry building elements, such as arches, chimneys, cavity walls, which are not necessarily of brick.
10. Masonry Unit Construction lists masonry units with the exception of brick and stone, but makes no reference to Construction, as its title implies.

The detail of the filing system provides similar obstacles to efficiency: Cements are intercalated with Tests and Testing, an engineering branch:

6. Magnesium Oxychloride
7. Refractory
8. Tests and Testing
9. Mason's Cement
10. Waterproofed.

Co-ordinates under Ornamental Metal are listed as follows: Alluminum, Alloys, Shapes, Special Treatments, Characteristics of metals, Magnesium, Sculptural, Titanium, Expanded Metals,- Base metals are mixed with product design, fabrication processes and metallurgical observations.

The fact that the AIA decided to base its new 1960 Building Products Register[1] on Sweet's Catalog File indicates that the

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1. 1960 Building Products Register AIA, Washington, The American Institute of Architects, 1960.

Standard Filing System has been partially abandoned by its makers.

Sweet's Catalog[1] provides 35 main sections. Although they are not further grouped, their principle of arrangement is apparent:

All catalogues deal with Building; either substance (sections 1-34) or service (section 35). "Substance" is divided in

Sections 1 - 3 Structure,
Sections 4 - 15 Materials (as used by building trades),
Sections 16 - 22 Products (opening and closing devices),
Sections 23 - 28 Equipment,
Sections 29 - 34 Mechanical and Electrical.

The sections are arranged so that they gradually lead from heavy site construction to fine shop mechanics, a sequence which more or less co-incides with the chronological sequence of building. In addition it provides a separation of materials according to the extent of their manufacture.

Since most catalogues dealing with a product provide also selection tables and method descriptions the scheme may be termed successful for its range.

The unruly mass of catalogues to be cast into this scheme however poses certain problems. The one-place classification principle is counteracted as most manufacturers like to see their product in as many places as possible. This trend is particularly justified where basic materials are concerned. Plywood, plastics, bituminous products, metals, have many uses. The Catalog tries to compensate by cross-references in the supplementary alphabetical index:

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1. Sweet's Catalog Service Division, A Classified Collection of Manufacturer's Catalogs, New York, F.W. Dodge Corp., 1960.

1. FOUNDATIONS
   Piles or piling 1a
   Concrete, Fibre forms for 2i

and by introducing multiple-place entries:

2. STRUCTURAL SYSTEMS
   Adhesives (see specific application).

As a result, a singular division for adhesives does not exist.

The exclusiveness of the s cheme brings with it a certain "warping" as it attempts to accommodate foreign items. Removable concrete forms are properly Contractor's Plant. They are neither building substance nor service. Their inclusion under Structural Systems is forced. In such case it should be expected that they would be isolated in a self-contained subdivision under the nearest concept, but this is not the case. Although such sub-division exists, forms are scattered and classified under overlapping viewpoints (material, removable, purpose, location):

2. STRUCTURAL SYSTEMS
   (a) Concrete Forms, Troffers
   Fibre tubes,
   Steel forms for slabs,
   Removable forms,
   Joist and filler block,
   Floor lath

   (d) Poured and Cast Slabs, Planks, Tiles
   Form board for poured-in-place roof construction,
   Fibre tubes for voided structures

   (i) Accessories
   Fibre forms
   Form hardware

Some mis-classifications could be rectified by cross-reference addition:

2. STRUCTURAL SYSTEMS
   (d) Poured and Cast Slabs, Planks, Tiles
   Hot rolled sub-purlin sections (neither slab,plank or tile)

(c) Roof, Floor Decks (only steel decks are listed, but no asbestos-cement systems).

As a classified collection of Manufacturers' catalogs the file does not include trade sections.

Standards Collections can be viewed as a group. Standards are individually published as certain practices crystallize and a concensus of the parties interested can be reached. Standards deal with specific items. Although the number of publishing authorities reaches the two-dozen mark, no list of publications is arranged in other than arbitrary order.

Certain Building Codes are an exception. The Housing Standards[1] primarily a design code for sub-dividers, follow in 53 sections the building process from Site Planning through the construction process to Site Improvements. Its painstaking details make it useful beyond its intended scope.

A more typical example is the collection of Canadian Government Specification Board Specifications. It consists of 100 arbitrarily established groups

55-GP-[2]	Fishing Gear
56-GP-	Miscellaneous Bituminous Materials & Rel. Products
57-GP-	Surgical Instruments
58-GP-	Silicone Masonry Water Repellents
59-GP-	Standardization of Metal Gauges

to which an indefinite number of specifications can be linked:

58-GP-1	Water Repellents, Colorless,
43-GP-10547a	Liners, Case, Water Resistant.

Occasionally materials and works standards have been published separately:

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1. Housing Standards 1958, Division of Building Research, National Research Council, Ottawa.
2. GP - General Purpose.

58-GP-1 Water Repellents, Colorless, Silicon Resin Base
58-GP-2 Recommended Methods for Application of Silicon Resin Base Masonry Water-Repellents.

In his struggle for a conclusive order, the specification writer does not stand alone.

The classification of plants is the oldest and most completely developed of the scientific aspects of botany. Within the last 200 years there have been numerous attempts at natural classification as man-made categories grew incongruous. The plant kingdom comprises about 450,000 plants, and Theophrastus' classification of plants into trees, shrubs, and herbs is reminiscent of the first three trade sections in building. Current classifications according to e volutionary d evelopment are still based on Charles Darwin's "Origin of Species" (1859), and its elaboration by Tippo[1] is one of the current representative schemes in use.

However botanical research in recent years attempts to understand the plant according to its chemical, physical, and mathematical characteristics, on the assumption that it is an agreement of data rather than an agreement of resemblance that will reveal its ultimate order.

In animal classification superficial resemblance sufficed originally to group seemingly like objects. This grouping put birds and bats, whales and fishes in like categories. But closer examination revealed certain incongruities, and so b ats were recognized as mammals that flew, and whales as mammals that lived in the water. Again the concept arose, that fundamental

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1. H.J. Fuller and O. Tippo, College Botany, New York, Henry Holt & Comp., 1949, p. 528-529.

structure provided better criteria for classification.

Older zoologists believed that each kind of animal descended from its own particular ancestry, that the original pair was a distinct, totally unrelated creation, and that a species so created was essentially unchangeable. The term "relationship" was hence used in a loose sense, and it was not until the traditional concept of parallel plans of immutable structure was finally discarded and replaced by the principle of modification by descent, that relationship took on its real significance. It now became evident, that animal and plant life represented one progressive, enlarging, and evervarying series of adaptive organisms, which could be classified and categorized in tree-of-knowledge form.[1]

The evolutionary order permits such lineal classification, which leads from a primitive unicellular organism to the complexity of an animal adapted to a certain manner of life.[2]

A certain analogy of these two examples to the evolution of the organization of specifications cannot be overlooked: architectural specifications first comprised three trade sections, and as building requirements became more exacting, special trades branched off this nucleus. The industrial development further enlarged trade sections, and although many specifications were developed that could only be met by manufacturing processes, the

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1. E. Mayr, E. Lindsley, and R.L. Unsinger, Methods and Principles of Systematic Zoology, New York, Henry Holt & Comp., 1953.

2. Sequence: Organism (biol.), Kingdom, Phylum, Class, Order, Family, Genus, Species.

traditional concept of trade sectional division of a specification was retained.

An industrial product, such as plastic domes, can only be arbitrarily classified under this principle. A plastic dome consists of a formed acrylic sheet, an aluminum frame, neoprene gaskets, and stainless steel fasteners. Its classification under Roofing is not justified, as the roofer merely connects to it, in a manner as the bricklayer connects to structural steel. It is not truly a miscellaneous metal item, or a non-ferrous metal item since the plastic dome, its main component part, does not fall under this category. In some specifications such items are collected under a section titled Miscellaneous. Such procedure recognizes a necessity to differentiate between trade sections and specifications of unclassifiable items, mainly industrial products for installation under no applicable trade and thus signifies the obscolescence of the old order. Similar examples can be given, not only of composite industrial products, but also of those in which special skills are required in the manufacture of single-material products: wooden laboratory equipment cannot be classed as Carpentry, aluminum curtain walls cannot be classed as Miscellaneous Metals, pre-stressed concrete beams cannot be classified under Concrete, because it is not the concrete trade but the concrete industry which is to fill the specifications.

Since the number of industrial products to be classed now exceeds the number of trade products, and since trade sectional division is no longer congruent with the pattern of individual specifications, its replacement by a new method appears natural and necessary.

CHAPTER III

A PROPOSED SCHEME.

REQUIREMENTS AND LIMITATIONS.

1. The scheme shall be designed to accommodate 5000 entries. The AIA Filing System shows approximately 1500 entries, 1000 of which are architectural. Reeve-Sleeper's Architectural Specifications contain an estimated 1000 architectural clause headings. The CGSB system may be regarded as balanced with 1000 architectural specifications. A catalogue count of a maintained loose catalogue file showed just over 1000 catalogues. Sweet's File 1960 contains 185 architectural subdivisions and an estimated 1000 catalogues. However, a combination of sources including those not mentioned will require a higher capacity.

2. It shall be designed as a One-Place Classification. Library systems are designed for indefinite capacity. The modest proportions of the proposed scheme are expected to minimize the difficulties encountered in library systems.

3. It shall permit universal use. Building cannot be effectively separated from other specialized subjects. Roof-Top Planting is Landscaping. Landscaping is not Building. Hence Landscaping must appear apart from Building and other specialized subjects must be treated likewise.

4. It shall codify specification source material. It shall combine the advantages of the master-copy with the

advantages of filing systems. This requires material grouping in erection-chronological order and a notation system which when laid out in numerical sequence will retain that order. The pattern must allow any clause of a master-copy and any heading of a filing system or building code or standard specification to fall into place. Any topic from whatever source shall have a code number.

5. Its pattern shall be independent from its entries. Variations in time, subject-focus and regional practice occur. The scheme must not be invalidated by such variations but must permit fluctuations of contents without changing its structure.

6. It must be easily understood.
It must be as easy to determine the approximate place of a given subject within the scheme as it is easy to determine the location of a letter within the alphabet. This means that it must be based on significant natural criteria, free from personal viewpoints, workable without index.

7. It must be compact.
The physical features of the system must be such that it can be accommodated on a commercial catalogue filing platform requiring two square feet of desk space.

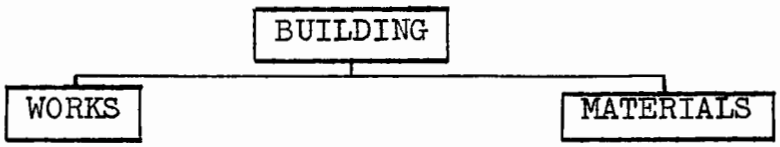
The scheme has been developed as a "Special Library System". It deals with a narrow, limited scope, that portion of Building falling under the concept "architectural". For universal use it must be related to a universal system. The main principles of

the Universal Decimal Classification, the manner in which materials, works, building elements have been presented are in agreement with the intent of the proposal. The UDC is however not elaborate enough for, nor particularly directed towards, the organization of specification source material. But it sufficiently accommodates related subjects for which the specification writer needs no tabulation beyond that provided by the UDC.

Applicable general schedules of the UDC can be replaced by the proposed system. Through this merger a schedule with a special core properly related to other fields would be obtained.

DIVISION.

The term "Building" permits two interpretations: Building the process and Building the substance. It would seem natural to divide accordingly:-



1. Placing (the building)
2. Erecting
3. Installing
4. Applying
   (a) Protecting
      (i) Covering
         Roofing
         Siding
         Flashing
      (ii) Coating
      (iii) Sealing
   (b) Finishing
5. Co-Relating

1. Stone, natural and artificial
2. Earth, Ceramics, Glass
3. Metals
4. Wood
   (a) Softwood
      (i) Coniferous
         Pine
         Spruce
         Hemlock
      (ii) Broad leafed
   (b) Hardwood
5. Bitumens, Plastics, Paints

TABLE IV

CONVENTIONALIZED DIVISION OF "BUILDING" WITH EQUAL EMPHASIS ON WORKS AND MATERIALS.

Such individual classification,[1] although consistent, comprehensive, detailed and flexible, fails its purpose because it fails to co-relate each work-facet with a corresponding material-facet.

The architect's primary concern is the economy of "the building" in terms of design. The contractor's primary concern is the economy of "building" in terms of industrial efficiency.

Rosen states that

> The specifications for today's building are written particularly for the General Contractor's estimator, his sub-contractors, manufacturers, and material dealers, all of whom may need to 'take off' the items of their work for estimate.
>
> For convenience in writing, for speed in estimating, and for ease in reference, it has been found that the most suitable organization of the specifications is a series of sections dealing successively with the different trades and in each section grouping all of the work of the particular trade to which the section is devoted,[2]

but conceives, that

---

1. Before a workable complex pattern is understood, individual branches are often tentatively organized. Individual classification has an isolating effect. It is therefore unsuitable as a classification system, but facilitates an inventory of viewpoints, one of which may ultimately lead to a solution.
2. Harold J. Rosen "Organization of Specifications", Progressive Architecture, March 1959, p. 9.

> It is not a simple matter to determine the proper subdivision of the trades, and once made, it is not necessarily permanent. Changes will occur as materials change and union jurisdiction changes. Concrete work was formerly a general mason's work; now it is a separate trade. Wood forms for concrete were once specified under Carpentry, but are now specified under the Concrete section. As new methods of work develop, they will at first be done by an existing trade but later come under the category of anew trade. The separation of trades varies in different localities, and the subdivision of specifications should generally conform to the practice of the local building trades.
>
> Trade-union practices will cause changes in trade divisions of the specifications, as the trades relinquish or gain control of certain work or features of work. The specifications writer cannot solve these problems for all time in his specifications, since union practices and use of materials continue to change.
>
> There are some sections of the specifications which are written on a basis of the similarity of the materials, which are specified in one section of the specifications for convenience of the specifications writer. For example....
> .....
> .....the erection of the wallboard is performed by carpenters, while the taping and cementing of joints is claimed and performed by painters.[1]

Reeve-Sleeper provides corresponding evidence under Bathroom Accessories:

> The local jurisdictional labor award should govern the Division in which accessories are installed. Metal accessories are often required to be set by the Plumber, cabinets with integral electric lights by the Electrician, built-in china or porcelain accessories by the Tile Setter.[2]

---

1. Rosen, Ibid., p. 9.

2. Rosen, Ibid., p. 597.

However,

> The division of the work among his subcontractors is the Contractor's responsibility and the Architect assumes no responsibility to act as arbiter to establish subcontract limits between any sections of the work."
>
> There is no provision in the specifications which prohibits the General Contractor from lumping or redistributing the various trade sections in any manner he wishes.[1]

In fact, the architect is only vaguely familiar with the various labor awards of his province, and at the time specifications are prepared, the successful contractor, and the manner in which the work will be actually distributed is not known. Hence, it cannot be organized, or classified, by the architect.

In a strict sense, therefore, specifications are not prepared as an instrument of the contractor's service, but as an instrument of the architect's service.

If, however, the division-of-work problem is one of contractor's superintendence, then specification source material can be organized according to substance, a natural classification criterium as discussed.

1. Design, Material, Fabrication.

The term "material" shall mean any matter of which the building will eventually be composed, hence shall exclude manufacturer's plant, such as scaffolds and forms.

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1. Rosen, Ibid.

Within this scope, material can take any form, from chemical elements (unalloyed aluminum), to composite manufactured products (plastic dome skylights with fusible link opening device).

In a narrower range

> Aluminum is the substance of aluminum extruded shapes.
> Clay is a substance of brick.
> Dimension lumber is the substance of glue-laminated timber.

Any material therefore can form the substance for a material of higher order.

To obtain the material of higher order the base material is made to comply to a design by way of a fabrication process. Thus a product can be specified by its design, substance, and method of fabrication.

A sequence beginning with the chemical element aluminum and leading through brick to the substance building is illustrated in Figure 9.

In the case of brick, only the upper half will be relevant to project-specifications. The location of relevance in similar arrays changes with the material or the viewpoint applied to it. For instance the specification of aluminum alloys for curtain walls will appear in the same tier as Kaolin, both being modified aluminum.

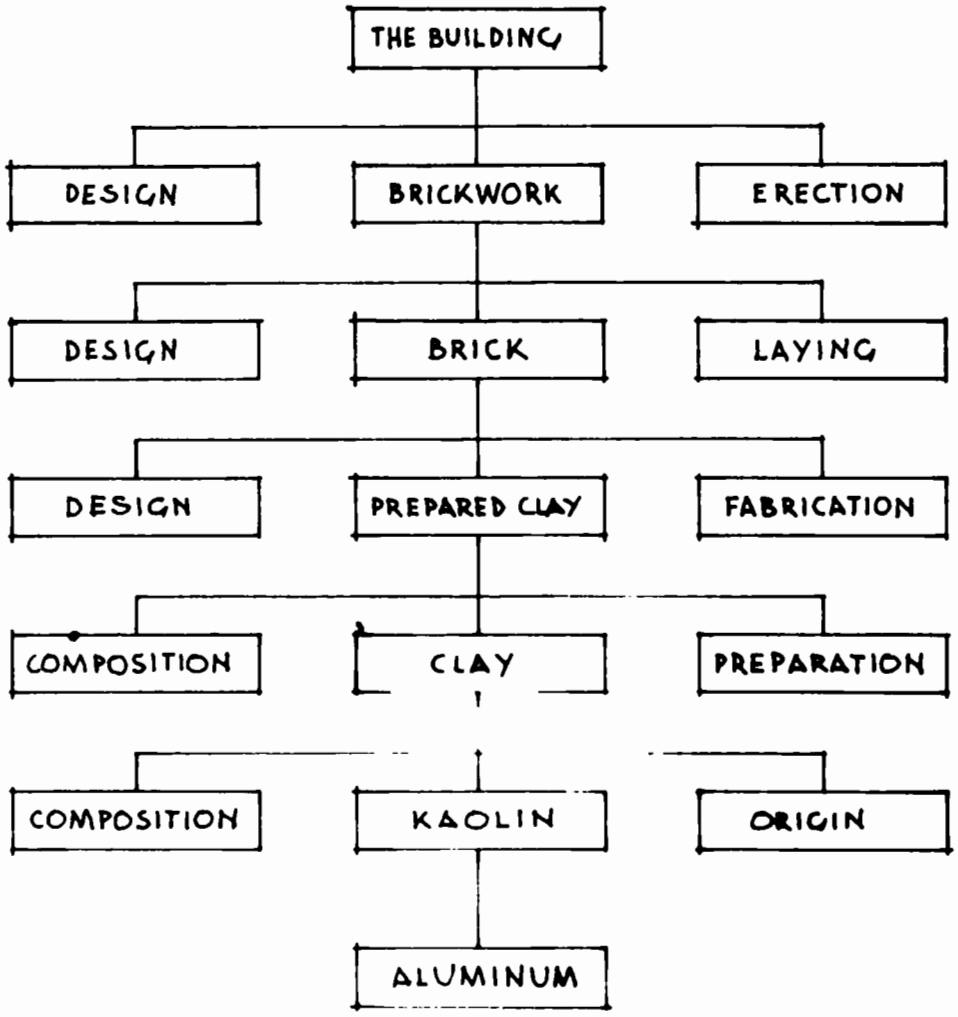


FIGURE 9

EXTENT OF MANUFACTURE OF "HEAVY CERAMICS" SHOWING ONLY THE MAIN MATERIAL COMPONENT AFTER EACH DIVISION.

The center column represents Material, on the classification of which the proposed system is based. The right hand column represents Works. The illustration shows why the fabrication of brick is "Work" from the Manufacturer's, but "Material" from the Bricklayer's standpoint.

The left hand column represents Design. It accommodates material selection tables for the lower tiers and construction requirements for the higher tiers: Cavity wall descriptions, glass-block panel design requirements, windload and acceptable deflection for windows, brick grades and types, lumber grades, beam deflection schedules, etc.

The seventeen items listed contain no "headings". Aluminum, for instance, does not appear as a heading for building components made of aluminum, but as a chemical element. Brick is not used as a heading for all types of brick and brickwork, but represents a qualified product. Entries are realistic.

Design and Fabrication, which are linked to the center column shall be detached to form separate schedules.

However, in order to preserve the Design - Material - Fabrication - cross-relation, identical notation for each item of each tier shall be retained.

Example:

DESIGN SCHEDULE	MATERIAL SCHEDULE	FABRICATION SCHEDULE
2.7 Brick types	2.7 Brick	2.7 Brick laying

The center columns of several models can now be co-related.

2. Extent of Manufacture.

To relate co-ordinate materials contained in sequences of different substance origin, the grading of those sequences must be uniform. The sequence ranging from chemical elements to the completed building can be divided according to the extent of manufacture of each product. Decimal division appears satisfactory for that purpose:

	0	Building Elements
Building Components	1	Trade Components
	2	Industry Components
	3	Parts and Accessories
	4	Finished Products
Products	5	Semi-finished Products
	6	Raw Products
Materials	7	Conglomerates and Mixtures
	8	Compounds and Alloys
	9	Chemical Elements

The sequence is divided into a uses group 0 Building Elements without material reference and a materials group 1 through 9, which is further divided as shown.

The following are the definitions for the individual terms: 0 Building Elements- A model of a building taken apart will consist of a number of elements: roofs, walls, foundations, shafts. These may be qualified through form and function, but not through material definitions; sloped roofs, curtain walls, pile foundations, stair cases. From here reference can be made to their respective material types: Wood piles, concrete piles, steel piles, etc. Therefore this category can be viewed as a classified index of main uses.

Divisions 1 through 9 pertain to the actual substance of the building in its three distinctive forms:

Materials, such as clay, gypsum, iron, bitumen, from which any type of product can be made; they are "formless" without characteristic dimensions.

Products, such as brick, plaster board, sheet steel, roofing felt, of standard shapes, sizes or thicknesses, which may be combined or cut to suit particular dimensional requirements on the job.

Components, such as brick walls, metal roofs, fire escapes, flag poles, which have definite fixed dimensions harmonizing with the project design. In combination they can be thought of as "materials permeating the structure": all brickwork, all metalwork, all plasterwork.

Hence "Formless", "Standard Size", "Custom Shape" shall be the rough criteria for the main divisions.

A number of products can be named offhand that apparently defy such over-simplification. Flagpoles come in "standard sizes". However, commercial terminology should not be confused with the above definitions, which are based on the state of a product in relation to the completed building.

Materials	7	Conglomerates and Mixtures
	8	Compounds and Alloys
	9	Chemical Elements

The term Chemical Elements is used to include commercial base materials which apart from impurities are chemical elements: Iron, lead, copper, unalloyed aluminum.

The terms Compounds and Alloys are used to include commercial materials which, apart from impurities and dilutions, are characterized by their chemical or metallurgical bond: Silicates, alloys, chemical compounds.

The terms Conglomerates and Mixtures designate materials obtained through mechanical composition: Earth, concrete mix, asphalt emulsion, glazing compounds.

It is realized, that the division of all materials in three groups is necessarily crude. However, the scarcity of reference to these groups justifies this limitation. The following example will demonstrate the workability of the proposed definitions in a dubious case:

Elastomeric Glazing Compound consists of a base compound and an accelerator which, when mixed together form a compound suitable for gun application.

Commercial Hydro-chloric Acid consists of abase chemical compound and a retarder (water) which, when mixed together form a liquid suitable for brush application.

Both are technically mixtures.

The classification of commercial hydrochloric acid under chemical compounds however, appears justified and consistent under the viewpoint of Building. The dilution of a

chemical compound with water would change the intensity but not the quality of its reaction. Therefore, it would not prevent its classification under Chemical Compounds, as the presence of carbonates in iron would not prevent its classification under Chemical Elements.

Products
(4 Finished Products
(5 Semi-Finished Products
(6 Raw Products

Product classification is based on product comparison:

Examples:

4 FINISHED PRODUCTS	galvanized wire mesh	plastic coated plywood	galvanized sheet steel	glazed brick
5 SEMI-FINISHED PRODUCTS	wire mesh	plywood	-	brick
6 RAW PRODUCTS	wire	veneers	sheet steel	-

Definitions:

Raw products- The product is dimensioned merely by its cross-section.

Semi-Finished Products - Standard dimensions have been added.

Finished Products - A coating has been added.

Discussion:

A. Glassfibre appears on the market as follows:

1. Loose fibre, bagged.
2. Nodulated or granulated, bagged.
3. Blankets, batts, or pressed slabs.
4. Batts enveloped with permeable membrane.
5. Batts enveloped, plus vapor barrier.
6. Pressed slabs, enveloped and waterproofed.

Only three categories are available for classification:

Items 1,2, and 3, as merely mechanically treated glassfibre will classify as raw products.

Items 4 and 5 are comparable to plywood, wallboard, concrete block. They are semi-finished products.

Item 6. The applied coating intended to protect the product from the elements qualifies it as a finished product.

B. Glazed brick is shown co-ordinate to galvanized wire mesh as Finished Product. The criterion is the measurable (mil thickness) applied coating, the glaze. Hence the following treatments would not rate as "finishes" :

Mechanical textures (corduroy, tapestry),
Silicone treatments,
Vitrification.

Untreated brick would not rate as raw product because of its distinct dimensions.

C. A variety of finishes apply to aluminum. As a raw product it appears as foil, sheet, wire, rod, bar, pipe, plate, strip and shape. As a semi-finished product it appears as grilles, shingles, thresholds, ladder rungs, etc.

The following factory applied coatings would qualify either raw or semi-finished products as finished products:

All electro-chemical finishes,
All applied coatings for permanent protection.

With the following surface treatments the class of the products would remain unchanged:

Mill finish (embossing, crimping, perforating)
Mechanical finish (lining, buffing, rubbing, sandblasting)
Chemical finish (etching, conversion)

and

Temporary protective coatings
Finishes applied after installation.

D. All glass that cannot be cut after fabrication rates as semi-finished product. Its size is inherent in the material quality or the fabrication process. Doorglass, bullet-resisting glass and hermetically scaled double glazing units and glass blocks fall into this group.

Glass with an applied surface finish, such as mirrors, enamelled plate glass, enamelled glass block, rate as finished products.

All other glass, plain, frosted, patterned, tempered or decorative laminated glass, rates as raw material.

Building Components
(1 Trade Components
(2 Industry Components
(3 Parts and Accessories

The distinction between "Industry Components" and "Trade Components" boils down to the distinction between "assembling" and "building".

For instance a reinforced concrete ceiling can be built or assembled: The formed, reinforced and poured-in-place ceiling is a trade component, while the ceiling assembled from pre-fabricated slabs is an industry component.

This definition fixes the place of certain materials within the proposed scheme, as illustrated on the following examples:

Item	Current Practice	Proposed Class	Reason
Pre-stressed concrete beams	Concrete	Ind.Comp. artificial stone	Manufacture
Fire Escapes	Misc. Metals	Ind.Comp. Ferrous Metals	Manufacture
Pipe Railings	Misc. Metals	Trade Component Fer. Met.	Job fitting and welding
Doors and Windows (Wood)	Carpent.	Ind.Comp. Wood	Manufacture
Curtain Walls	Curtain Walls	Ind.Comp. Non-Fer.	Manufacture
Concrete Mix	Concrete	n.a.	Multi-purpose base product classified under Conglomerates and Mixtures.

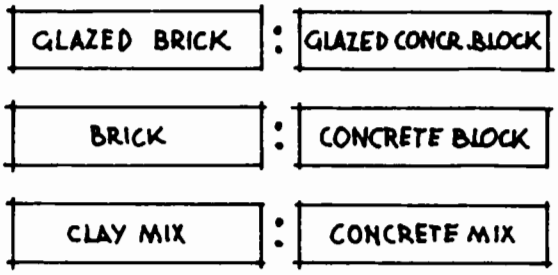
Parts and Accessories pertain to specific building components. They have no other use, but are interchangeable with the types of components. Flagpole accessories, anchor ties, metal fasteners are typical examples of this.

3. Co-ordinate Materials

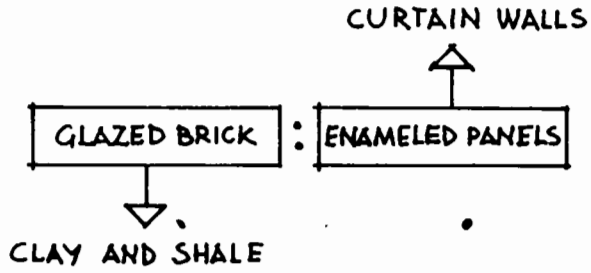
Materials of corresponding Extent of Manufacture shall be termed co-ordinate materials.

Figure 10 illustrates how co-ordinate materials appear at corresponding levels of division. (Example 1).

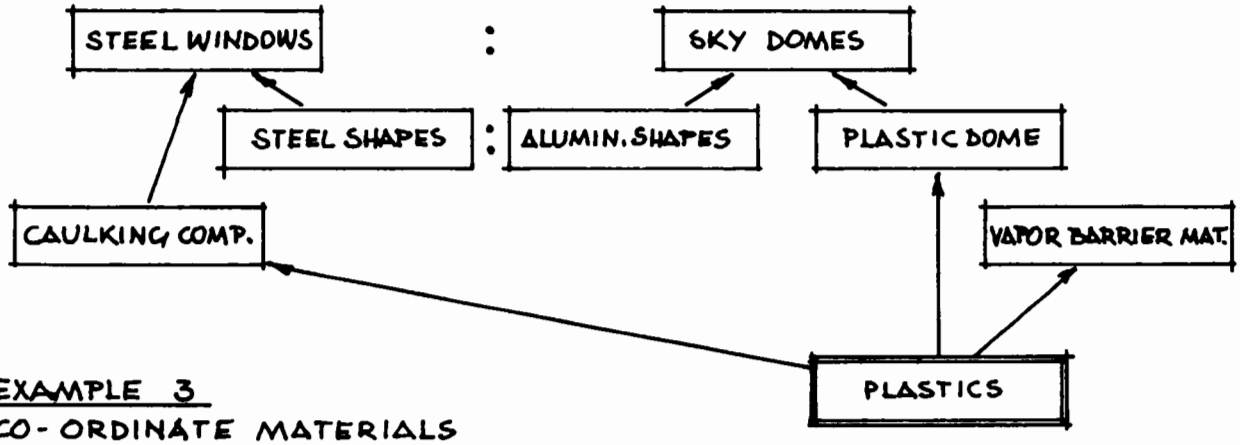
If one material sequence is linked to another through co-ordinate materials, variations in the location of



EXAMPLE 1
CO-ORDINATE MATERIALS



EXAMPLE 2
CO-ORDINATE MATERIALS
AS PART OF SEQUENCES
WITH OPPOSITE LOCATION OF RELEVANCE



EXAMPLE 3
CO-ORDINATE MATERIALS
RELATING COMPLEX SYSTEMS

LEGEND

COLON (:)	INDICATES	"CO-ORDINATE TO"
ARROWS (→)	INDICATE	"PART OF"
▭	INDICATES	"COMMON IDENTITY"

FIGURE 10
CO-ORDINATE MATERIALS

relevance express themselves in a vertical slide rule pattern. (Example 2).

Products may consist of combinations of several materials, the plotting of which may result in a more or less irregular pattern. Where the base material for one product is also the base material for another product, it is co-ordinate (or equal) to itself. One-place classification is thus made possible. (Example 3).

Such fixed points of common identify, the co-ordinate materials concept, and the establishment of material sequences make it possible to lay out a total pattern with almost geometrical accuracy.

Decimal division can also be applied to co-ordinate materials (1-9) and their respective uses:

0. Building Elements
1. Foundations
2. Walls
3. Roofs
4. Floors
5. Ceilings
6. Frames
7. Vertical Transportation
8. Openings and Closures
9. Ancillary Parts.

1-9. Compounds, Products, Materials
1. Earth and Stone
2. Artificial Stone
3. Ceramics and Glass
4. Ferrous Metals
5. Non-Ferrous Metals
6. Wood
7. Bituminous Mat., Lin. & Cork,
8. Rubber and Plastics
9. Liquids and Pastes.

The system affords the opportunity to introduce approximate

erection - chronological order at this stage. Such order has never been conclusively established.[1] Librarians dealing with a similar problem argue as follows:

> The order of the main classes...is not of prime practical importance. It is in the ultimate divisions, sub-divisions and sections of the main classes that changes are frequent and inevitable. And these are easily dealt with by means of the flexibility which we presume to be a necessary feature of all acceptable schemes. Main classes should be reasonably co-ordinated and be comprehensive, well planned and expansive.[2]

and further - "while the sequence of the main classes is not critical, there may be as well some order as none at all".

The order proposed here is influenced firstly by the consideration that excerpts taken from the system should appear roughly in the order in which they will be used in project specifications.

By grouping materials according to substance (material columns) and arranging these groups according to their solidity, this order is sufficiently approached, because the most solid materials - those of the highest compressive strength - will appear at the project first, while the liquids are mostly finishing materials, which will appear last.

It is realized that such sequence is not fully exclusive, (mercury is both a metal and a liquid) but neither can it be termed inconsistent, because minerals, metals and wood are, apart from minor exceptions, neither plastic nor liquid.

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1. Published trade section indexes do not co-incide (Appendix B)

2. Sayers, Ibid.

Secondly there is a limited relationship between materials and their uses in building elements and where such exists it should be brought into proper alignment: Ideally a single material sequence would satisfy a single purpose.

Building Elements	0	Curtain Walls
Components	1	- - (Trades, n.a.)
	2	Aluminum Curtain Walls
	3	Fasteners
Products	4	Enamelled Aluminum Panels
	5	Aluminum Panels
	6	Aluminum Shapes
Materials	7	- - (Caulking Compounds)
	8	Aluminum Alloys
	9	Aluminum

However, multiple uses of one material and multiple materials for one use (Frames can be Concrete, Steel, and Wood; Concrete can be Wall, Floor and Frame) create reciprocal patterns of spreading and converging relationships, as illustrated in Figure 11.

In the foregoing example Aluminum is ideally aligned with Curtain Walls. However, Curtain Walls are sub-ordinate to Walls, and it appears more realistic to align Walls with Masonry (hence Number 2 in both groups), than with Non-Ferrous Metals.

CO-RELATION.

After criteria for material classification have been established, a total pattern can be laid out. It will form a fabric of items and relations the characteristics and limitations of which are known:

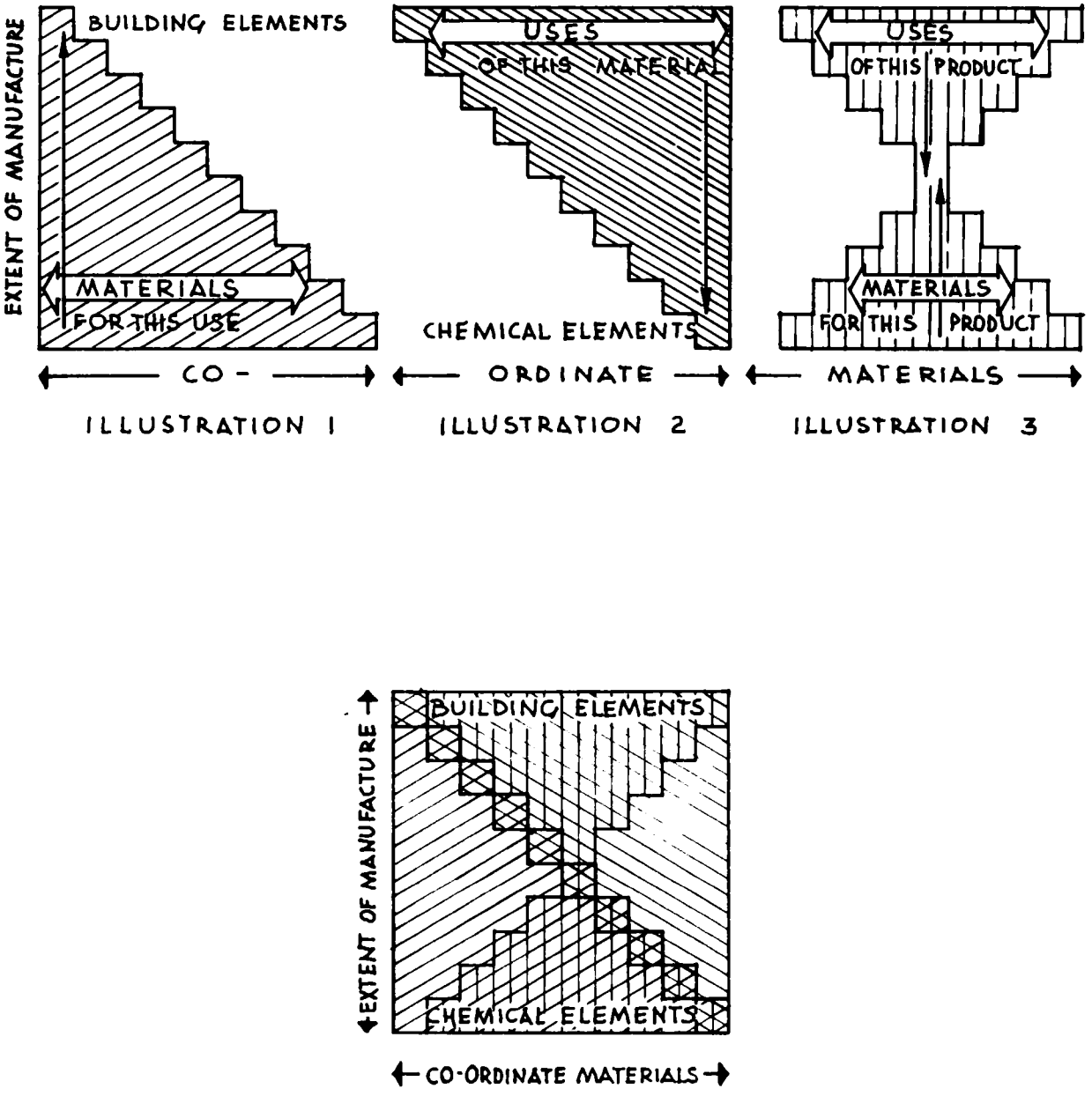

FIGURE 11

CONVENTIONALIZED COMPENSATING RECIPROCAL PATTERNS OF MATERIALS AND USES FORMING THE CO-ORDINATE GRID.

(a) The bottom tier will be formed by a limited number of chemical elements.

(b) The top tier will be formed by a limited number of building elements.

(c) Entering the pattern from the bottom would lead from one specific material to the various uses to which it can be put: "Iron" will lead towards Structural Steel, Reinforcing Materials, Sheet Metal, Ornamental Metal, etc. (Figure 11.- Illustration 2).

(d) Entering the pattern from the top would lead from a use to required and alternative materials: "Grill" will lead towards Iron, Bronze, Brass, Aluminum, Stainless Steel, Hardwood, Plastic, Concrete, Etc. (Figure 11.- Illustration 1).

(e) Entering the pattern at an intermediate point would lead to both, uses and materials, in an hour-glass pattern: "Brick" would lead upwards to Walls, Chimneys, Piers, Paving, etc., downwards to Clay, Kaolin and Impurities, Aluminum, Oxygen and Hydrogen. (Figure 11.- Illustration 3).

Therefore, if the number of entries in the top tier and the number of entries in the bottom tier are known, and the extension of one element towards its uses cannot exceed the number of entries in the top tier, and vice-versa, the extension of any entry in the top tier towards required and alternative materials cannot exceed the number of entries in the bottom tier, and if top and

bottom tier are made equal through grouping or spacing-out, then the total of all materials components and assemblies can be plotted on a co-ordinate grid of which the ordinate corresponds to "Extent of Manufacture" and the abscissa to "Co-ordinate Materials".

With the resulting table, each field of which permits supplementary elaboration, the skeleton of a master-specification has been prepared.[1]

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1. Table V.

MATERIAL CO-ORDINATE TABLE SHOWING DISTRIBUTION OF TYPICAL ENTRIES

TABLE V

0.0 BUILDING ELEMENTS (USES)	0.1 FOUNDATIONS PILES & PILING 624.15	0.2 WALLS WATER PROOFING DAMPPROOFING	0.3 ROOFS ROOFING METAL ROOFING : 1.4 BITUMINOUS : 1.7 VINYL : 1.8	0.4 FLOORS FLOORING METAL : 1.4 WOOD : 1.6 LINOLEUM : 1.7	0.5 CEILINGS ACOUSTIC TILE PLASTER CEIL. : 1.2 PLASTER BOARD : 1.6	0.6 SKELETON FRAMES	0.7 VERTICAL TRANSPORT. STAIRS METAL : 2.4 WOOD : 1.6	0.8 OPENINGS & CLOSURES DOORS METAL : 2.4 WOOD : 2.6	0.9 ANCILLARY PARTS FIN. HARDWARE FLAGPOLES STEEL : 2.4 WOOD : 1.6
1.0 TRADE COMPONENTS	1.1 NATURAL STONE WORK FLAGGING	1.2 ARTIFICIAL STONE WORK CONCRETE WORK WATERPROOFING, PLASTERING, TERRAZZO	1.3 CERAMICS AND GLASS BRICK MASONRY GLASS BLOCK MASONRY ARCH. TERRA COTTA WORK	1.4 FERROUS METAL WORK ROOFING, FLASHING SHEET METAL WORK METAL FLOORING	1.5 NON-FER. MET. WORK ROOFING, FLASHING SHEET METAL WORK	1.6 CARPENTRY WORK ROUGH, FINISH, WOOD FLOORING	1.7 BIT., LIN., & CORK WORK ROOFING, WATER- & DAMPPROOFING, LINOLEUM FLOORING	1.8 RUBBER & PLASTIC VINYL ROOFING VINYL FLOORING	1.9 PAINTING
2.0 INDUSTRY COMPONENTS	2.1	2.2 PRECAST & PRESTRESSED CONCRETE : BEAMS, COLUMNS, CURTAIN WALL COMPONENTS	2.3	2.4 STRUCTURAL STEEL WORK INDUSTRIAL DOORS METAL PARTITIONS MISC. FER. MET. WORK	2.5 CURTAIN WALLS NON-FER. MET. CHIMNEYS MISC. NON-FER. MET. WORK	2.6 GLUED-LAMINATED WORK MILLWORK	2.7 BIT. FIBRE PIPE LINES	2.8 PLASTIC DOMES PRE-FABR. PLAST. LAMINATES	2.9
3.0 PARTS AND ACCESSORIES	3.1 FOR NAT. STONE WORK	3.2 FOR ART. STONE WORK PLASTER BOARD CLIPS METAL FURRING, ASB. CEM. FASTENERS	3.3 FOR CERAMICS AND GLASS METAL TIES WALL REINFORCING, EXPANSION BOLTS	3.4 FLAGPOLE BASES AND FITTINGS, NAILS, SPIKES, STAPLES	3.5 PLASTIC HANDRAIL COVERS	3.6 TIMBER FASTENERS JOIST HANGERS	3.7	3.8 PLASTIC GASKETS NEOPRENE GASKETS EDGE STRIPS AND MOULDINGS FOR PLAST.	3.9 ADHESIVES
4.0 FINISHED PRODUCTS	4.1	4.2 GLAZED ASB.-CEMENT GLAZED CONCRETE BLOCK (REINF. POLYESTER)	4.3 GLAZED BRICK GLAZED TILE MIRROR GLASS ENAMELED GLASS BL.	4.4 PLATED AND ENAMELED FERROUS METAL GALV. WIRE MESH	4.5 COATED NON-FER. METAL CURTAIN WALL COMP.	4.6 PLASTIC COATED WOOD AND PLYWOOD	4.7 SURFACED BITUMIN. ROOFING & SIDING MATERIALS	4.8	4.9
5.0 SEMI-FIN. PRODUCTS	5.1 NAT. STONE MASONRY UNITS	5.2 ART. STONE SAND-LIME BRICK CONCRETE UNITS ASBESTOS CEMENT	5.3 CLAY & SHALE BRICK QUARRY TILE STRUCT. CLAY TILE GLASS FIBRE PROD.	5.4 OPEN WEB STEEL JOISTS METAL STUDS WELDED STEEL WIRE FABR. WOVEN WIRE MESH	5.5 ALUMINUM COMPONENTS	5.6 GLUE LAMIN. TIMBER WOOD BLOCKS PLYWOOD SHINGLES AND SHAKES	5.7 BITUMINIZED FIBRE PIPE ASPHALT FLOOR TILE LINOLEUM	5.8 VINYL TILE PLASTIC LAMINATES PLASTIC INSULATING BOARD (EXP. POLYSTYR.)	5.9
6.0 RAW PRODUCTS	6.1 EXP. VERMICULITE	6.2	6.3 GLASS MINERAL WOOL	6.4 STRUCTURAL STEEL SHAPES, PLATE, WIRE, REINFORCING BARS	6.5 NON-FER. METAL SHAPES, PLATE, ETC.	6.6 YARD LUMBER STRUCTURAL TIMBER VENEERS	6.7 SHEATHING PAPER ROOFING FELT COTTON FABRIC	6.8 VINYL SHEETING PLASTIC SHAPES PLASTIC WALL COVERING	6.9
7.0 CONGLOMERATES AND MIXTURES	7.1 ROCK, EARTH, GRAVEL, SAND, SILT	7.2 CONCRETE (MIX) MORTARS GROUTS PLASTERS	7.3	7.4	7.5	7.6	7.7 ASPHALT TAR PITCH	7.8 PLASTIC AND RUBBER BASE COMPOUNDS	7.9 PUTTY, COATING MAT., PAINTS, IMPREGNA- TING MATERIALS, WAXES
8.0 COMPOUNDS AND ALLOYS	8.1 GRANITE STONE MARBLE	8.2 WATER CEMENT LIME CALCIUM CHLORIDE	8.3 GLAZES	8.4 STAINLESS STEEL	8.5 BRASS, BRONZE ALUMINUM ALLOYS MONEL METAL NICKEL SILVER, SOLDER	8.6	8.7	8.8 POLYETHYLENE POLY VINYL POLYESTER MELMINE RESINS	8.9
9.0 ELEMENTS				9.4 IRON	9.5 ALUMINUM LEAD COPPER ZINC				
	NATURAL STONE	ARTIFICIAL STONE	CERAMICS, GLASS	FERROUS METALS	NON-FER. METALS	WOOD	BITUMEN	RUBBER, PLASTICS	PASTES, LIQUIDS

CHAPTER IV

INFORMATION DISPOSAL, MAINTENANCE AND USE.

MOTIVES.

A prerequisite towards economy in building is the specification of materials and labor that are readily available. That availability is subject to perpetual fluctuation as, apart from a constant stock, new materials appear, others disappear from the market, and methods of application, installation, and erection of those in use change. Next to the utility of its design the efficiency of a master specification is therefore determined by the degree to which it can keep abreast with the developments of the building industry.

Generally speaking the collection of specification source material can be overdone, if extended too far into the Contractor's or Manufacturer's domain. A certain degree of detail manufacturing and detail construction knowledge will reflect favourably in a project specification, but a certain restraint exercised in favour of purely architectural requirements will also favourably increase the relevance of the specification as a contract document. An example in case is the application of rigid insulation using the push-box method. Since the push-box is contractor's plant, its construction and the method of its operation may be recommended (and such recommendations are superfluous under competitive conditions), but should not be made mandatory.

On the other hand, indiscriminate additions of even applicable material creates an undue amount of maintenance, which the practicing office cannot afford. The specification writer or the section supervisor is presumed to have a fair idea which type of source material will come in handy and should retain only whatever can pass such appraisal.

Outdated entries should be deleted or renewed. The use of the master specification affords constant opportunity to compare present entries with the flow of current information, and dated specification source material helps to rejuvenate the collection.

All standard specifications and their amendments are dated:

CSA A 23.3 - 1959
National Building Code 1953
CGSB 9-GP-2 16 February 1951
ASTM D 1226 52 T (1952, tentative specification)
ACI 617 - 58

Old specifications are dated, unreliably though, because both newly developed and antiquated parts may be indistinguishably intermingled under the same date.

Manufacturers' catalogues, with some exceptions, are not dated.

Holders of standard specifications are informed of amendments by the publishing authority. Manufacturers instruct their customers of new developments, but frequently a product disappears from the market without notice.

Therefore those parts of a master specification that are not under constant observation should be annually reviewed.

Obstacles to the efficiency of a specification section which is otherwise sufficiently staffed and equipped, can be pinpointed by an analysis of the types of mistakes found in their specifications.

Mistakes are basically of three types:

1. Those which the contractor is obliged to report.
   - (a) Discrepancies between drawings and specifications:
     - (i) Omission of items shown on drawings.
     - (ii) Items specified at variance with drawings.
     - (iii) Items specified more than once.

2. Those which the contractor needs to clarify before bidding.
   - (i) Materials specified but not available or identifiable.
   - (ii) Ambiguities requiring architect's judgement.

3. Those which the contractor can ignore without repercussions to himself.
   - (a) Specifications in contrast to good building practice.
   - (b) Specifications in contrast to good economy.
     - (i) Specifications of materials not locally available.
     - (ii) Specifications of materials of unnecessarily high performance.

This list indicates that the more costly portion of mistakes includes those that the contractor is not obliged to report to the specifying authority, and that that portion is the result of unreliable specification source material rather than a hasty survey of the project drawings.

While it may be accepted that no perfect project specification has ever been written, even under ideal conditions, and while perfection seems to be a matter of degree, the complete neglect of maintenance in favour of production can lead to critical conditions as the stock of source material progressively depletes to a point of virtual uselessness. The cause can be traced either to work preference of the staff, overload of the section, or lack of direction.

Arguments advanced against maintenance of specification source material are of the following sampling:

"We had no trouble during the past ten years, why should we change now?" - There is no reason to change, unless the statement is false.

"We must keep the specifications simple, otherwise the contractor would not understand them. The contractor cannot be expected to be familiar with code numbers of standard specifications, therefore we might as well not use them".

- Which contractor?

"If we refer to standards at all, then simple notation is meaningless, unless we also quote the essential parts of the standard".

> Copying excerpts from ASTM specifications is not recommended. Such a practice frequently results in the omission of pertinent sections of the specifications which may lead to misunderstanding, dispute and possible law suits.[1]

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1. Structural Clay Products Institute, Washington, D.C., Technical Notes on Brick and Tile Construction, Vol. 9, No. 2, February 1958.

"Everybody must agree that building fifteen years ago was of much higher standard than it is today. Therefore outdated specifications are not necessarily inferior".

- Does the client authorize deviations from current construction practice?

There are three aspects under which management may loathe research:

1. It produces no immediate revenue.

"It may be profitable in the long run, but let's not think about it now". - The fact that research and production go hand in hand is not realized.

2. It is not thought necessary.

"We can't afford it, and we have no time for it".

- The prerequisite for output is input.

3. A vague specification permits negotiation with the contractor.

Walter Schmidt related the following observation:

> That there are architects in Vienna who have their Master-tradesmen, one after the other, meet them in a coffee house to receive their views and instructions, and draw - whatever there is to be drawn, on the marmor table; the master shall keep it roughly in mind, measurements to be taken on the job; off and on the Piccolo appears to wipe the table with a wet rag to make space for new drawings: this the author would have taken for an anecdote, had he not accidentally once seen such an architect in action.[1]

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1. Walter Schmidt, Ein Architect Geht Ueber Feld. Otto Meyer. Ravensburg, 1946.(Transl.f.German An Architect walks His Field) p. 32.

On this continent the General Contractor receives the instructions for his sub-contractors, and the architect remains formal. But traces of the desire to retain the freedom of the "final touch" are evident - such as in hardware allowances - and justifiably worth the extra security amount added by the bidder to the contract price where such freedom has been retained in the specifications beyond fixed provisional sums.

While such "controlled vagueness" is proper practice, a critical situation may develop where maintenance of specification source material is intentionally curbed.

A gifted designer is one who has sufficient vision to lay out a building with bold but skilled strokes creating the prototype of the final design. There is virtuosity in this process and a senior staff member bent on design has rarely enough split personality to mentally exclude from it anything that comes under his jurisdiction, nor will he recognize the minuteness of a specification as deriving from a matured concept.

Vagueness leaves room. Non-authorization of research strengthens that situation where, dependent on the line of authority, the designer "still has to be asked", because the specification writer's only alternative is to adopt his master's virtuosity: "...shall be done as approved by the Architect".

It is realized, that most "weasel clauses" originate with the specification writer himself, but the aspect that he needs a congenial setting to do his work properly, should not be entirely discarded.

While this situation, unbalanced as it is, and reckless as it may be, still testifies to energetic pursuit of professional goals, the exploitation of vague specifications leads to the final and pathological motive for maintenance of specification source material, or lack of it.

Where a specification is kept too vague for accurate bidding, the contractors are either forced to withdraw from tendering or to negotiate with an approving authority. Contract prices may vary about 20 per cent because of the range of interpretations possible. Oral commitments to one of the contractors may represent sufficient security to him to bid low but still promising enough for a profit sharing arrangement.

However, once maintenance becomes an established policy, its technical aspects move into focal interest.

MAINTENANCE.

Within the established framework of the system, maintenance shall mean the entering, modifying and deleting of specification source material. It shall also mean the remodelling of the system itself.

Librarians agree that although not universally used, decimal notation is the most uniform and the shortest devised.[1] Where the number of co-ordinate entries exceeds ten, the UDC combines as

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1. This has never been plainly expressed, but comparison of criticisms leads to this conclusion. Sayers (Ibid., p. 126) states that "the notation was and remains the most obvious reason for the world-wide use it [the UDC] enjoys; that is, an international "language" understood by all nations".

many decimal sequences as required under one heading:

546.1 Non-Metals and Metalloids in General

18 co-ordinate entries

(	.11	Hydrogen
(	.12	Halogens in General
(		etc.
(	.19	Arsenic
(		. . . . . .(546.2 omitted)
(	.21	Oxygen, Water, Air
(	.22	Sulphur
(		etc.
(	.29	Inert Gases

546.3 Metals in General

The proposed Co-ordinate System is independent from, but interrelated with, the Universal Decimal Classification System. Specification source material spreads over related fields of knowledge, merely focussing on Building. The UDC sections related to Building therefore have been remodeled to form a new unit.[1]

The Abridged Building Classification with the new unit substituting for the sections removed provides the classified index for the master-specification. Through this merger it is hoped to achieve balance: the ABC provides about 300 entries for architectural specification source material, while the Co-ordinate System is designed for several thousand. The remainder of the ABC however is considered adequate to accommodate the less plentiful specification source material provided by related fields for application in architectural specifications.

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1. Figure 12.

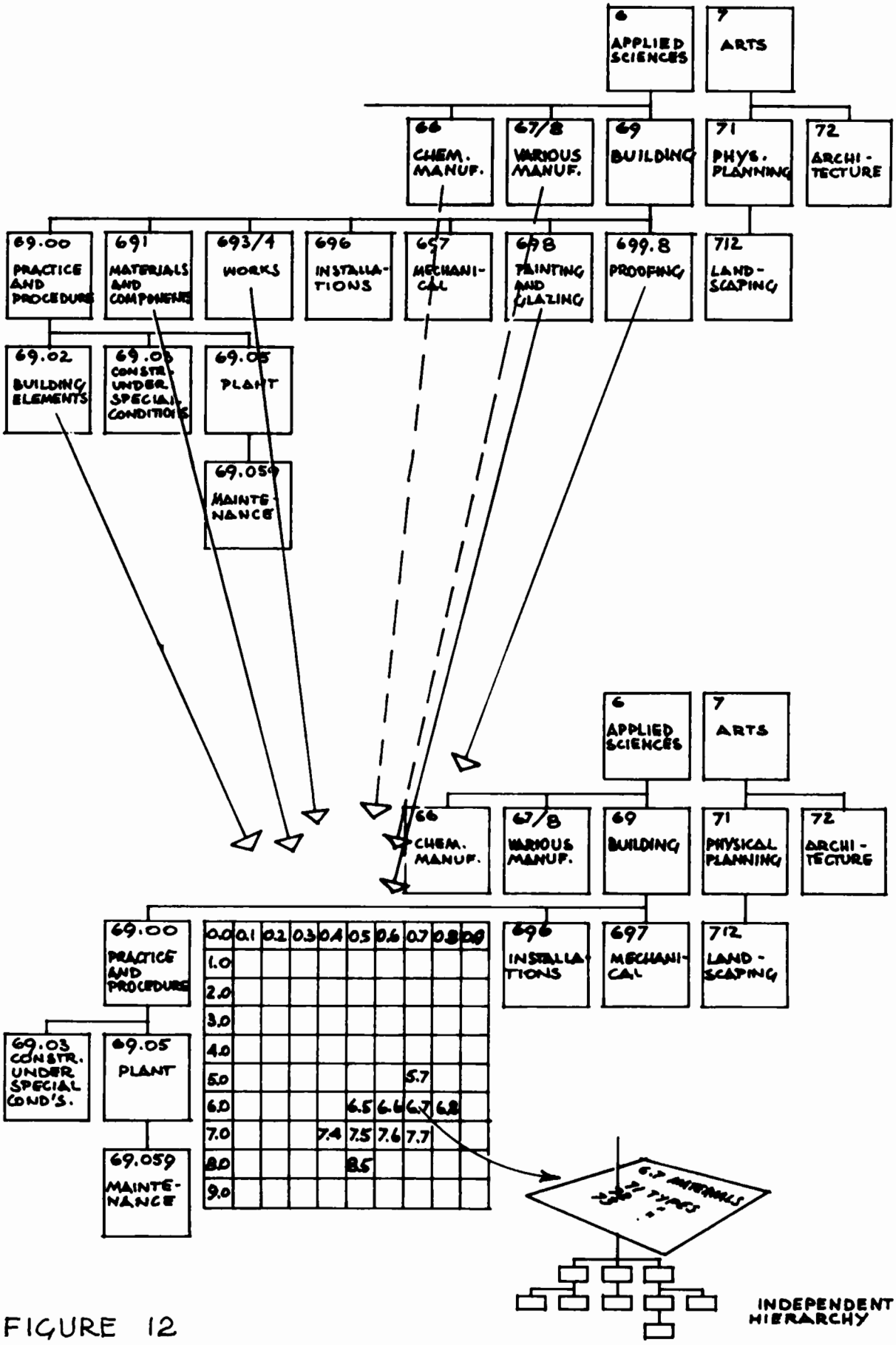

FIGURE 12
THE CO-ORDINATE TABLE WITHIN
A PATTERN OF GENERAL KNOWLEDGE

Detail observations:

(a) The five focal sections of the ABC are scattered. The System combines those plus various entries from the manufacturing sections (ABC 66 Chemical Industries, and 67/8 Various Industries).

(b) UDC notation of materials and works is not aligned. The most favourable example appears thus:

691.4 Brick: 693.2 Brick Laying.

In the co-ordinate table co-ordinate materials, some of which constitute "alternative materials" in project work, have identical first digits (example simplified):

6.4 Steel Bars ; 6.5 Aluminum Bars

Sub-ordinate materials have identical last digits (simplified):

5.6 Plywood ; 6.6 Veneer

(c) At the relevant tier ABC notation already requires three digits before actual material classification can begin:

691.32 Concrete

The UDC uses a period after each group of three digits for orientation. The Co-ordinate System uses a period to separate the ordinate from the abscissa:

7.2 Concrete

While the UDC requires five digits, the Co-ordinate System entering the UDC at an intermediate level merely requires two digits for the same item.

Two-digit notation will accommodate one hundred main classes.(0.0-9.0).

It has been mentioned that normative classification encounters three "layers" between the ultimate summum genus and the last species, similar to those present in the proposed sequence of ordinates. Each layer to be penetrated requires a different technique.

In library systems the first layer, defined as of large extent and small intent, was divided according to philosophical views, which as the schemes gained complexity diminished in importance.

The second layer posed the problem of interrelation between the branches of knowledge. Different views and different techniques led to the various current systems.

The third layer finally posed no problem, since once relationship was set, the species could be further subdivided by establishing a simple hierarchy, the branches of which, in principle could be independently developed as they were not directly related to other fields.

The UDC provides the philosophical division and the pattern for the interrelationship of the branches of knowledge. The proposed Co-ordinate System enters the process there and provides its own pattern of material interrelationship, completing the techniques required for the penetration of the second layer.

For the penetration of the third layer the two-dimensional Co-ordinate System now requires a third dimension, which can be obtained by intercalation of independent hierarchies at any point of the co-ordinate grid pattern.

Disregarding all zero (general) notations, the Co-ordinate system allows for 9x9= 81 material groups. Each group shall allow for nine types of materials of the same group and each type shall head a hierarchy limited for estimate to nine entries. Then the system would have a total capacity of 6.561 of which perhaps two-thirds will be used, leaving a working capacity of 4-5,000 as intended.

Initial classing as illustrated on Table V corresponds to the sketch layout of a floor plan. It is a normative process, fundamentally sound, but disregarding detail at this stage. A random number of building substances are entered in the co-ordinate table, each under its own material designation and expanded according to its several stages of manufacture. A rough schedule results:

4.6 Plastic Coated Plywood
5.6 Plywood
6.6 Veneers

2.4 Wire Partitions
4.4 Galvanized Wire Mesh
5.4 Wire Mesh
6.4 Wire
9.4 Iron

or in numerical order under their respective headings:

2 INDUSTRY COMPONENTS
2.4 Ferrous Metals
Wire Partitions

4 FINISHED PRODUCTS
4.4 Ferrous Metals
Galvanized Wire Mesh
4.6 Wood
Plastic Coated Plywood

5 SEMI-FINISHED PRODUCTS
5.4 Ferrous Metals
Wire Mesh
5.6 Wood
Plywood

6 RAW PRODUCTS
6.4 Ferrous Metals
Wire
6.6 Wood
Veneers

9 ELEMENTS
9.4 Ferrous Metal
Iron

Veneer for plywood can be located without reference to an index because it appears under the next lower manufacture in the same material column:

5.6 Plywood
6.6 Veneers

Similarly, alternative materials will appear under the same Extent of Manufacture:

4.2 Glazed Concrete Block
4.3 Glazed Brick

Diagonal reference is accomplished by a colon:

0.3 Roofs and Roofing
Built-up Roofing : 1.7
Copper Roofing : 1.5

Standard Specifications are similarly referred to:

6.7 Asphalt Saturated Roofing Felt :CSA A 123.6
6.4 Steel and Wrought Iron Products :CSA G 134

Notation for Design, Material, and Fabrication is identical. Therefore different standard specifications for each will appear under the same notation under the respective schedules:

DESIGN	MATERIAL	FABRICATION
	7.9 Water Repellent :CGSB 58-GP-1	7.9 Application of W.R. : CGSB 58-GP-2
1.9 Paint Selection	1.9 Paint (Trade Component)	1.9 Painting (General Workmanship)

Additional information disposal will result in multiple entries under one co-ordinate notation. From here on further classing is empirical.

Multiple entries are in order as long as the individual item corresponds to the Substance / Extent of Manufacture concept or the Building Element group:

0.2 WALLS
.21 Boundary and Party Walls
.22 Exterior Walls
.23 Stationary Partitions

8.1 NATURAL STONE
.11 Granite
.12 Limestone
.13 Marble

The further analysis of these "species" leads into hierarchies as illustrated in Figure 12 which can be tabulated as the following example:

(Co-ordinate group)	8.1	NATURAL STONE
(Species)	.11	Granite
(Hierarchy)	.111	Commercial Granite
	.1	Granite
	.2	Gneissic Granite
	.3	Granite Gneiss
	.4	Gneiss
	.112	"Black Granite"

Appendix C with 840 entries has been developed on that principle.

Phillips[1] describes three methods of maintenance:

1. Simple Revision
   - (a) by addition
   - (b) by suppression
   - (c) by reduction
2. Partial Remodelling
3. Total Remodelling.

1. Simple Revision - Adding will be identical to the method described in the foregoing chapter.

Accumulations in certain branches result in unnecessary elaborate hierarchies. For instance the number of movable metal partitions on the market is rather high. Private practices usually limit their specifications to a number of proven products. Government specifications permit competitive bidding by performance and material requirements. Standard specifications cope with the situation by establishing types and grades to which products must

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1. Ibid., p. 220.

comply if that standard is adopted by the specifying authority.

In all cases, the total number of all products to be chosen from has been "suppressed", in favour of a few representative products or data. (Figure 13).

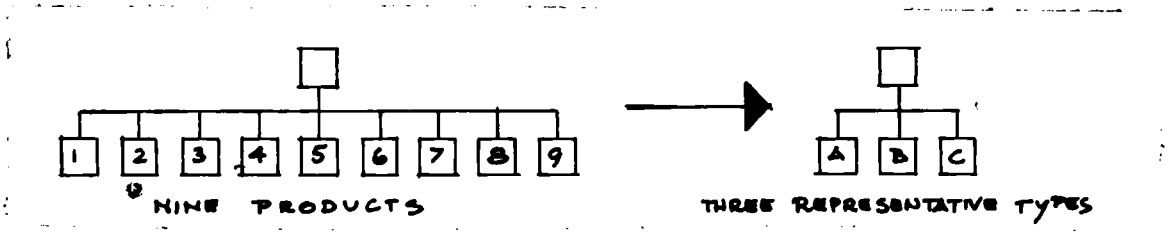

FIGURE 13

"SUPPRESSION"

Vice versa, where the ratio between products and types is reversed, i.e., where a small number of products make up a relatively large number of types, those products should be combined to form a reasonable number of co-ordinate entries under a general heading. (Figure 14).

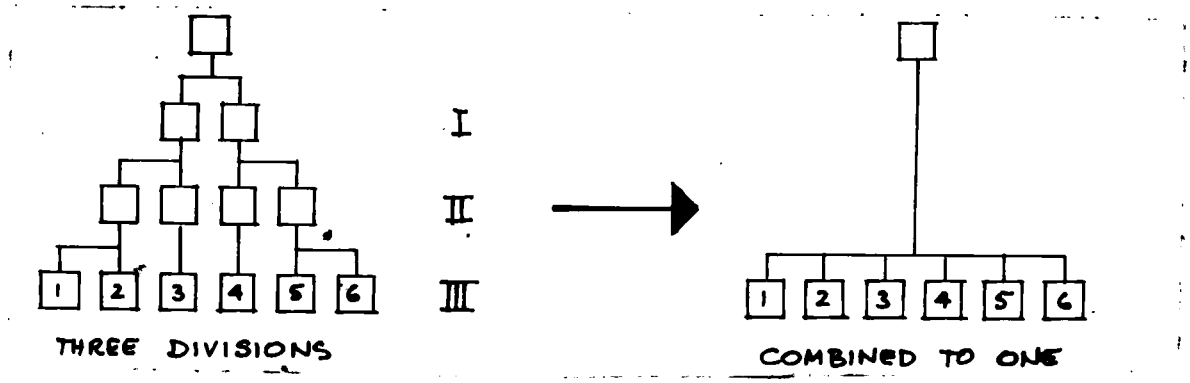

FIGURE 14

"REDUCTION"

Throughout this study a heading is regarded as representing contents, implying that the complete text of a specification will fall into place if its headings fall into place. A scheme now exists. To bring it to bear, its contents have to harmonize with it.

"Streamlined Specifications" aim at streamlining the wording of a specification.

Original: After hanging the fabric all surfaces shall be thoroughly cleaned of all traces of paste and spots.

The Contractor shall suitably protect the fabric until same has been accepted.

Streamlined: After hanging clean fabric, suitably protect fabric until acceptance.

Small cites the above condension and a further example in which the wording of a specification was reduced from 485 to 251 words.[1] Secondary source material should be scrutinized and if necessary treated in the above manner at the time of its incorporation into an overall scheme. However, modification of source material will not by itself create a concept, In other words, a normative result cannot be reached by all empirical method.

A large office decided that an Office Standard would be a time-saver. It was to be based on a number of latest project specifications as source-material. The idea was to lay out half-a-dozen specimen of one trade section, to omit duplicate requirements and to consolidate the remainder to a new trade section. All sections thus obtained would make up the Office Standard.

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1. Ibid., p. xiii - ivx.

The attempt would have failed on three counts, but was abandoned after the first obstacle was met.

1. Apart from a fractional portion, there were no duplicate clauses in the respective sections. Each project was different, was differently approached and written in different verbiage by different employees.

2. Project-specifications are secondary source material. They reflect part of, but are not, a comprehensive study of construction knowledge. They are geared to specific, unique project requirements. To render them generally applicable would require to "ungear" them, to know the whole before the partial can be seen in proper perspective.

3. System in an Office Standard cannot be expected to come about as a by-product of a collection of requirements. In the last analysis it is a viewpoint which interrelates the contents and classification cannot begin unless such viewpoint is established first. As Grace O. Kelley comments,

> It[classification] occupies a central position, but rather than assuming a separate entity it radiates light and provides reinforcement throughout the structure, preventing the whole from collapsing into a formless and undirected tangle.[1]

In this case it will be necessary to scrutinize each clause as to what it actually says, establish a number of corresponding headings and then formulate a wording for each clause to cover the combined contents. This is a tedious effort, worthwhile if

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1. Sayers, Ibid., p. i.

one considers that for instance three Demolition sections of 1 1/2, 2 and 2 1/2 pages respectively were in a separate effort reduced to 3/4 pages embracing all of what was meant to be said. However, this process takes time and rather than sorting out elaborate or specialized sections from usually "just-sufficient-for-that-particular-project" - specifications, it may well be concluded that it is more economical to start from scratch with primary source material and then to make adjustments to particular office requirements.

2. Partial Remodelling -

Piecemeal correction of the master-specification may serve for quite a long while, however when the co-ordinate table becomes unbalanced partial remodelling will be required. Current systems gain on authority through annual adjustments disregarding files set up according to previous issues. Sweets completely abolish office maintenance through annual publication of a complete set of catalogues.

Partial remodelling is possible by adjustments within the abscissa of the co-ordinate table, which contains the only semi-arbitrary sequence of the system.

This present study for instance, proposes a partial remodelling of the Abridged Building Classification to adapt it to special requirements.

3. Total Remodelling -

Total remodelling is undertaken where a system designed for one purpose is used to serve another purpose, i.e., where its

structure is independent from its contents. The National Building Code for instance uses a modified decimal classification system. Its contents bear no relation to Dewey's original contribution.

In analogy the co-ordinate table itself presents nothing but a graph holding two related sequences; -a universal method used wherever cross-relation is a requirement additional to mere enumeration.

USE.

The following directions preceding "A Compendium of Clauses for Direct Use in Architectural Specifications"[1] published 35 years ago, describing the basic method of use of specification source material are, with modifications, still applicable today.

To the Architect:

> Each section of this book has an index letter, each clause an index number, When Contract Drawings have been prepared, read through the book clause by clause. If a clause is applicable to the work in hand, jot down its number on an "Index Sheet".

This master-copy contained merely 17 architectural sections and glancing over the pages clause by clause was still possible.

Specification source material, if compiled, has now grown to a complexity in which this old method is no longer feasible. Each project contains only a fraction of all possible material and work requirements and checking through non-applicable text would exceed economical limits.

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1. Holland and Parker, Ibid.

"Pin-pointing" the required information eliminates that waste.

No two project specifications are alike. Some parts of project specifications vary with each project. Other parts may be considered constant. The variables and the constants shall be assumed to be approximately even.

On account of this dual feature two basic methods of use can be distinguished:

A. The method which proposes that changes can be made to a given set of compiled source material to produce a project specification, i.e., which is based on the constant part.

B. The method which proposes that project specifications can be composed from a set of source material, i.e., which is based on the variable part.

Where changes are few, basic method A will apply. Where the amount of changes is excessive, basic method B will be preferable.

Basic Method A

1. The "Dummy" System.

The "Dummy" System utilizes more or less ready written specifications. These are limited in scope and detail by the amount of labour expendable by their authors. Therefore blank spaces left to accommodate requirements beyond those elaborated are typical of master-copies designed for this use.

Reeve-Sleeper summarizes methods of use, the first four of which, in abbreviated form are:

i. changes made directly on the copy, using it as rough draft.
ii. changes made on wax paper to preserve the copy.
iii. changes through separate notation of applicable clause numbers.
iv. changes by way of selective dictation.

Provided that only omissions are necessary to produce the end result, the method can be regarded as efficient. However it loses on effect proportionately to the amount of additions to be made.

A blank means research requiring another set of data. The more blanks are left, the more the "dummy" defeats its time saving purpose, because it is the insert that is wanted rather than the complimentary text.

In general office practice "dummy" sections developed by the specification section serve a similar purpose. Under conditions of constant production, maintenance revisions to the "dummy" section conditioned by general advancements are required after about every tenth use.

The evaluation of master-copies designed for use as "dummies" should include this aspect.

2. The Dual System.

The Dual System utilizes ready written specifications. These are limited in scope and detail by the project range of the office in which they were developed. They contain no blanks.

The method of their use is described by Goldsmith[1] and Haas[2]: The ready written specifications are issued as "Office Standard", amendments thereto as "Project Supplement" or "Addendum Specification .

In principle any project specification can be used as Office Standard. It can be issued with a Project Supplement to make up a Dual Specification for another job.

This system is of particular interest to Government offices, where it has been modified for individual building types of standard construction: each building type has its own "office standard", sometimes called "Typical Specification".

References in general specification literature to "Small Schedules", "Large Schedules", Specifications for a Hospital, Specifications for Fireproof Construction, reflect the trend towards Office Standards.

While the Dummy System results in one copy, the Dual System results in two.. The proportion of volume between the Office Standard and the Project Supplement should be in favour of the Office Standard. Five percent by page count of the body of the Office Standard appears to be a normal and acceptable proportion for the Project Supplement. As the Project Supplement exceeds such limits, confusion may arise and the Dual Specification become unwieldy.

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1. Ibid., p. 26 and 90.

2. Harry Haas, "Office Standard" Specifications, Progressive Architecture, August 1959, Reinhold Publishing Corp., New York.

The Prime objective of the Dual System is the reduction of copy work.

Its main disadvantage is the hazard of over-reading. The main body is taken for granted by the specification writer; non-applicable passages or passages that need to be added to fill project requirements are often overlooked or not realized. Inquiries, extra claims or lawsuits may result. Goldsmith reports[1] that the New York Building Congress Specifications are designed for use as a Dual System. An Inquiry at the New York Office in August 1960, however, revealed that the Dual Specification System had been abandoned by this agency for some time.

Its use for the specification of recurring building types however is part of current practice and seems to confirm the system in that range of applicability.

Basic Method B

3. The Reference System.

The Reference System utilizes source material in any form. Utilization of specification source material is limited only by the user's awareness of it or the amount of information he can handle.

Master-Copies constitute an essential part of specification source material as they fill gaps in primary literature. For instance, the specifications for a bowling alley may not be covered

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1. Ibid., p. 26.

by the catalogue collection, but sufficient reference can be found in Small's Streamlined Specifications.[1]

The two remaining methods of use suggested by Reeve-Sleeper[2] apply here (condensed):

v. Compilation of project specifications from an Office Standard.
vi. Reference to specific data contained in the master-copy.

It is perhaps this secondary nature to which the popularity of master-copies can be attributed: one purchase provides a cross-section of information through the field. Sweet's annual publications are based on that observation (but provide only manufacturer's and special service literature).

The advantages of the Reference System are

1. The unlimited amount of source material available.
2. Its flexibility through a maximum of choice.
3. The utilization of primarily first hand information.

Its disadvantage is that under the traditional sectional division of the project specification, the information retrieved has to be re-edited to suit a conventional specification format; - an effort, the necessity of which merits review.

Opinion on the general arrangement of section contents is uniform, but divided as to its detail.

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1. Ibid., p. 146-149.
2. Ibid., p. ix.

Both Goldsmith[1] and Edwards[2] agree on the "What-How-Where" formula which in short-form would read

Linoleum ("What") shall be cemented ("How") to subfloors. ("Where")

This formula is also in agreement with the master-specification system, with the exception of the ambiguous "Where" which may have general (i.e. any subfloors) and specific meaning (i.e. subfloors in Room X). While reference to specific locations are project requirements, the general reference constitutes workmanship requirements, which are part of the master-specification under the auxiliary Methods schedule:

DESIGN	MATERIALS	METHODS
5.7 Linoleum selection schedules	5.7 Linoleum	5.7 Linoleum laying :1.2/2.2 on suspended concrete slabs

Three authorities deal with details of the section format. Data provided has been analysed and it has been found, that the arrangement of the section can in each case be remodelled to suit the theory of the co-ordinate concept without mutilating the contents or deviating from the intention of the authors:

In the Suggested Grouping of Edwards' "Types of Paragraphs", Supplements to General Conditions and Special Project Requirements should be disregarded as they apply only to project work.

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1. Ibid., p. 32.
2. Ibid., p. 28-32.

TYPES OF PARAGRAPHS According to Edwards	CORRESPONDING DESIGNATIONS of the proposed system
General Paragraphs limiting and distinguishing related work or the work as a whole	
Delivery of Materials	Supplements to General Conditions
Storage of Materials.	"
Shop Drawings	"
Samples	"
Manufacture	Material (Fabrication)
Workmanship	Workmanship
Requirements of Other Trades. .	Workmanship or Installation resp.
Permits	Supplements to General Conditions
Ordinances.	"
Guarantees.	"
Specific Paragraphs describing in detail each technical aspect of the work:	
Materials	Materials
Combination of Materials. . . .	"
Preliminary Work.	Workmanship or Installation resp.
Installation of Materials . . .	"
Tests	Supplements to General Conditions
Cleaning, Patching, and Adjusting.	Workamship or Installation resp.
Schedules	Special Project Requirements.
"	
Omittable Paragraphs	
General and Special Conditions	Supplements to General Conditions
Scope Paragraph	Special Project Requirements
"Work Not Included" Paragraph	"

SUGGESTED GROUPING

Materials	)	
(List)	)	
Manufacture	)	"WHAT"
Combination of Materials	)	
Methods (Workmanship / Installation)	)	
Requirements for other Trades	)	
Preliminary Work Prior to Installation	)	"HOW"
Workmanship / Installation of Materials	)	
Cleaning, Patching, Adjusting.	)	
(Schedules)		("WHERE")

Reeve-Sleeper's Architectural Specifications have been analysed on Table VI. Sub-section titles (Reeve-Sleeper: Sub-Division) have been listed consecutively, but re-grouped according to the Materials/Method concept, and related to the sections in which they appear. Headings have been scrutinized as to the meaning of the contents following, which accounts for the fact that some method headings appear under the Materials group in the table.

Terms similar in meaning, such as Method and Workmanship, Setting and Workmanship, Laying and Workmanship, can be combined. The list can be generally simplified, permitting the grouping by Materials, Methods (Workmanship/Installation), Design, and finally Manufacturer's Plant, an entry to be found outside the architectural materials in the general portion of the master specification.

The Standard Specification Format (revised June 9, 1959) provided by the Specification Writers Association of Canada for use by Technical Committees contains sixteen subdivisions, which can be similarly grouped:

Format analysed:

1. GENERAL CONDITIONS
2. SCOPE
3. MATERIALS
4. SHOP DRAWINGS
5. HANDLING AND STORAGE OF MATERIALS AT SITE
6. EXAMINATION
7. FABRICATION
8. WORKMANSHIP
9. (ERECTION), (INSTALLATION), OR (APPLICATION)
10. SCHEDULES
11. PROTECTION
12. INSPECTION AND TESTING
13. ADJUSTING, CUTTING AND FINISHING
14. CLEAN-UP
15. GUARANTEE AND/OR BOND
16. MAINTENANCE INSTRUCTIONS

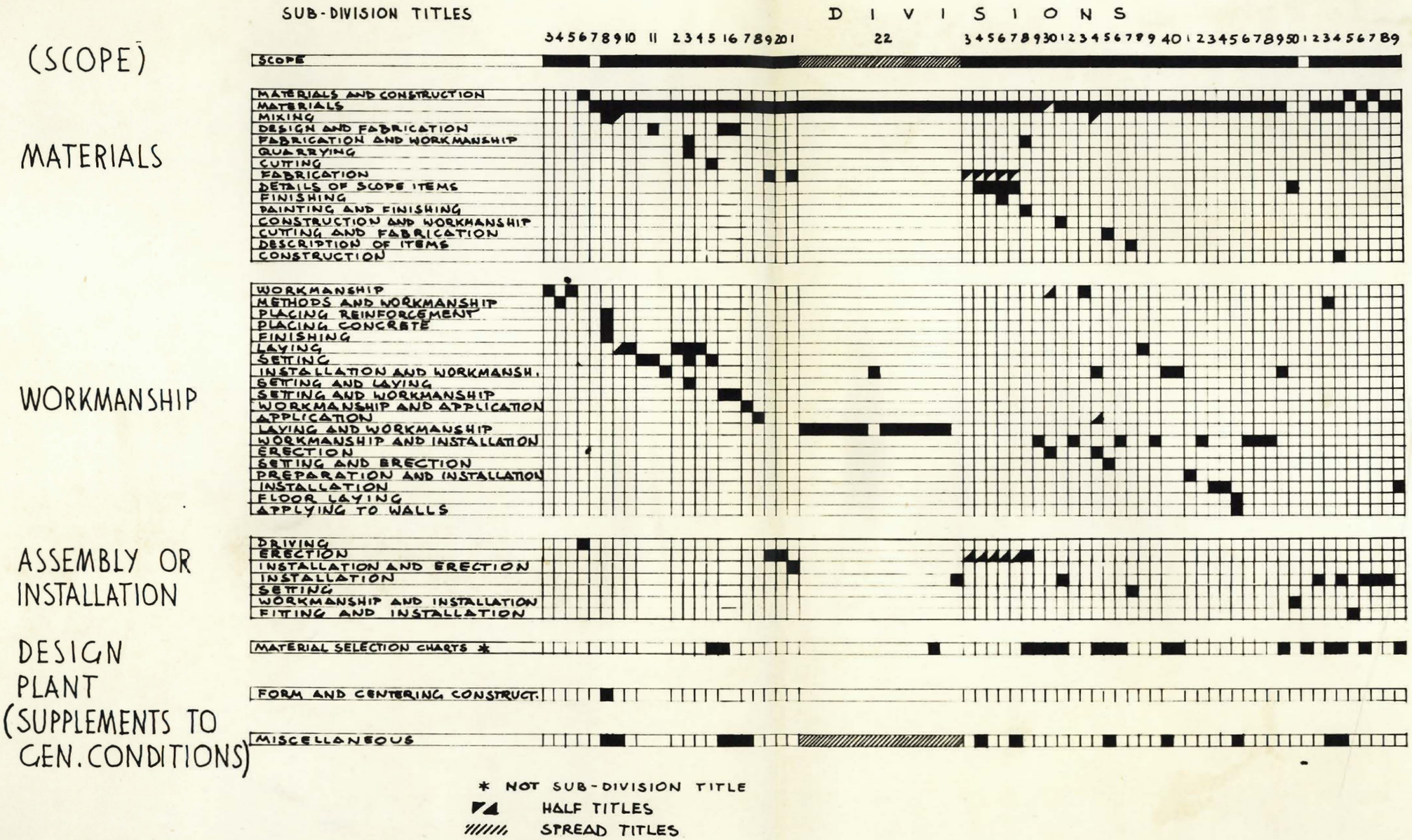

TABLE VI

CONCEPT SURVEY OF REEVE SLEEPER'S ARCHITECTURAL SPECIFICATIONS

Format suggested:

1. SCOPE (project-specifications)
2. MATERIALS
   Fabrication
3. WORKMANSHIP / INSTALLATION
   Examination
   Schedules (according to Note 1, SWA Format)[1]
   Erection, Installing, Application, etc.
   Adjusting, Cutting, Finishing,
   Clean-up.
4. SUPPLEMENTS TO GENERAL CONDITIONS (project-specifications)
   Shop Drawings,
   Handling and Storage,
   Protection,
   Guarantee and/or Bond
5. SPECIAL REQUIREMENTS
   (This group is added to accommodate references from outside the co-ordinate table)
   Inspection and Testing (description of procedure)
   Maintenance Instructions

Since the concept of the project specification format now approaches the master specification concept, fluent information exchange can take place between both.

However, the definition of heretofore loosely used terms makes the traditional concept of trade sectional division appear under a new light.

Specification writing started about 150 years ago, when the guilds ceased to exist and instructions had to be written down. At this time, four architectural trade sections sufficed to instruct four different artisans. Specifications were written by the architect.

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1. Materials and works applicable to specific locations within the structure.

As the volume of building increased, trades split to form new trades, and manufacturers began to produce materials, products, and components, that were readily absorbed by the building industry. Manufacturers also supplied their own standard specifications. Trades did not, and architectural specifications set out to combine both.

They did so in perpetuation of the trade divisional principle, which was a natural classification at a time, where trades did all the work, and the division was clear. To-day, the manufacturer is the major shareholder of all specifications, and it comes to pass, that glued-laminated timber cannot be classified under Carpentry, aluminum curtain walls cannot be classified as Miscellaneous metal, and pre-stressed concrete beams defy the Concrete section. Under the traditional order a subcontractor is addressed, but a manufacturer is expected to receive the message.

As a consequence, new sections have been introduced, which rarely contain more than one building component, or product. Moreover, further specialization within the building trades has led to individual sections for individual trade components. Reeve-Sleeper for instance already lists 13 individual sections under Roofing and Sheet Metal. A section dealing with Vinyl Tile on Suspended Concrete Floors can be grouped under Resiliant Floorings. However there are also wood floorings, metal floorings, concrete floorings, all of which fall under the concept Flooring, but which would have to be re-distributed under the traditional concept to Carpentry, Miscellaneous Metals, and Concrete, from which the General Contractor would have to extract and again re-distribute

them to specialists of the respective trades.

It appears therefore, that the concept of trade sectional division disintegrates in proportion to the diminishing extent trades occupy in the building industry, and if a new order can be devised that facilitates specifying, estimating, purchasing, manufacturing, building, and orientation, and at the same time eliminates searching and re-editing on the specification writer's side, and re-shuffling of individual component specifications on the contractor's side, then it can be assumed that the argument in favour of its economy will eventually gain ground.

With the re-orientation of the divisional concept, however, the disadvantage of the Reference System can be eliminated.

CHAPTER V

SUMMARY AND CONCLUSIONS.

Project specifications are based on specification source material. The pregnancy of the first depends upon the efficiency of the last. A set of specification source material, to be efficient, must be clearly organized. Organization of specification source material constitutes the problem of the organization of a minor, but specialized, branch of knowledge. It inhabits a border field between library science and architecture.

Library science has developed certain criteria, each of which plays a certain role in knowledge classification. The key problem is to detect the relevant natural classification criterion inherent in all the objects to be classified.

The division of building knowledge was originally based on a natural criterion, when all work was done by one or another trade. However work not done by a trade, cannot be classified under a trade. The equilibrium in volume between specification source material provided by trades, and that provided by manufacturing industries, was reached about five years ago, and the ratio has since increased in favour of the industries. Although trade sectional division is still a natural classification criterion, the object to be classified has changed, the trade divisional concept has since begun to fall apart, and artificial classification began. Inconsistency resulted. The operation of an inconsistent scheme, however, is incompatible with stringent production requirements, and the utility of specification source material

became to be questioned by practicing offices.

The present investigation attempts to show to what degree architectural schemes comply to proven concepts of knowledge classification, what causes the deficiencies of such schemes, and what requirements should be satisfied.

It was found that such a scheme would not only have to comply to the principles of general knowledge classification, but in addition would have to satisfy the special use requirements of the specification writer.

The basis of agreement between general knowledge classification and the classification of technological branches is the material concept. Material lends itself to natural classification and thus constitutes an alternative to Trade. To become an effective alternative, it had to be defined.

"Building Material" combines in it the concepts of Design, Substance, and Fabrication. Design and Fabrication can be developed as separate schedules related to a Substance schedule. Substance in turn permits simultaneous division by Substance Type and Extent of Manufacture. Since the auxiliary schedules follow this main schedule in notation, Design, Substance, and Fabrication can be read off under the same code number for each building material.

The division of concepts thus precedes the division of materials. Their combination produces a pattern, which is essentially a Master Material Selection Table with auxiliary Design and

Fabrication Tables, which in turn provide the place into which specifications can fall.

It is designed for a capacity of 5,000 entries.

It is set in proper relation to associated fields of knowledge.

It codifies specification source material.

Its structure is independent from its contents.

It is workable without an alphabetical index.

It accommodates architectural technical specification source material on two square feet of desk space and can be operated with one hand.

It separates selection tables, material specifications, and method specifications.

It defines and relates the terms Material, Product, and Building Component.

It defines and relates the terms Fabrication, Installation, and Workmanship.

It defines the scope of Building Trades.

It defines the scope of Manufacturing.

It defines and employs the concept Extent of Manufacture.

It provides consistent sequences of substances and substance combinations.

Entries approach erection chronological order.

It classifies materials according to uses, -and vice-versa, it classifies uses, to which materials can be put.

It contains sequences of alternate materials.

Each entry appears only once;- it is designed as a One-Place Classification system.

In average project work a specification writer produces about one section per day. Supposing the drafting of an equivalent to be incorporated into the master specification requires three times that much, and supposing the master specification will require the distributed equivalent of one thousand sections (typical section :"Vinyl Tile Flooring on Concrete", rather than "Flooring"), then 3,000 man-days per year, or ten specification writers, are required to produce and maintain the system during the three hundred-odd working days per year. Supposing also, that one thousand specification writers use the system, then the present time-waste caused by searching for appropriate information would be reduced to one/ one-hundredth, or to one cent per dollar employment cost.

The steady pressure of a job together with the magnitude of the task prevent the individual specification writer, even the individual team, from taking advantage of this implied economy. It can therefore be concluded, that a central agency, such as the Canadian Standards Association, the Specification Writers Association of Canada, or the Royal Architectural Institute of Canada, would have to do the job.

To do it would require an inventory of what is and what could be done. It would require that those who have contributed to the formation of what has been loosely called specification source material, those who will continue to do so, those who draw from it, and those who are to administer it, recognize the utility of a uniform concept agreeable to all.

The possibilities of natural classification as a tie between the many forms in which specification source material appears, were to be shown by way of at least one method, and the present investigation has been undertaken with that hope in mind.

A P P E N D I X A

W O R K S C I T E D

Books and Pamphlets

American Society for Testing Materials. ASTM Standards in Building Codes. Philadelphia, ASTM., 1958.

Baker, Earl P. and Langland, Harold S. Architectural Metal Handbook, Washington, National Association of Architectural Metal Manufacturers, The Lakeside Press, 1952.

Bliss, Henry Evelyn, The Organization of Knowledge. New York, Harry Holt & Comp., 1929.

Bliss, Henry Evelyn, A Bibliographic Classification. New York, The H.W. Wilson Comp., 1940.

British Standards Institution. Universal Decimal Classification, Abridged English Edition. London, BSI., 1948.

Brown, James Duff, Subject Classification. London, Grafton & Co., 1914.

Cutter, Charles Ammi, Expansive Classification. Boston, Cutter, 1891-1893.

Dewey, Melville. Decimal Classification and Relative Index. Boston, Library Bureau, 1876.

Deyer, Ben H., Specification Work Sheets. Washington, The American Institute of Architects, 1951.

Edwards, H. Griffith. Specifications. Toronto, D. Van Nostrand Comp., 1953.

Fuller, H.J. and Tippo, O. College Botany, New York, Henry Holt & Comp., 1949, p. 528-529.

Goldsmith, Goldwin. Architects' Specifications - How to Write Them. Washington, The American Institute of Architects, 1959.

Holland and Parker. Ready Written Specifications. New York, John Wiley & Sons, 1926.

International Building Classification Committee. ABC Abridged Building Classification. Bowcentrum Rotterdam, Section Documentation of the International Council for Building Research, Studies and Documentation, 1955.

Mayr, E., Lindslay, E., and Unsinger, R.L., Methods and Principles of Systematic Zoology, New York, Henry Holt & Comp., 1953.

Phillips, Howard. A Primer of Book Classification. London, Association of Assistant Librarians, 1955.

Ranganathan, S.A. Colon Classification. Madras, The Madras Library Association, 1933.

Reeve-Sleeper, Harold. Architectural Specifications. New York, John Wiley & Sons, 1955.

Sayers, Berwick, W.C. A Manual of Classification. London, Grafton & Co., 1955.

Schmidt, Walter. Ein Architekt Geht Ueber Feld. (trans.: An Architect Walks His Field). Ravensburg, Germany, Otto Meyer, 1946.

Small, Ben John. Streamlined Specification Standards. Vol. 1 New York, Reinhold Publishing Corp., 1952.

Structural Clay Products Institute, Technical Notes on Brick and Tile Construction, Washington, D.C., Vol. 9, No. 2, Feb. 1958.

Sweet's Catalog Service Division. A Classified Collection of Manufacturers' Catalogs. New York, F.W. Dodge Corp., 1960.

The American Institute of Architects. Filing System for Architectural Plates and Articles. (AIA Document 261). Washington, AIA, 1949.

The American Institute of Architects. Standard Filing System and Alphabetical Index. (AIA Document E-301). Washington, AIA, 1959.

The American Institute of Architects. 1960 Building Products Register AIA. Washington, AIA, 1960.

Vickery, B.C. Classification and Indexing in Science. London, Butterworths Scientific Publications, 1958.

Government Publications

Canada. National Building Code of Canada. Committee on the National Building Code. Ottawa, National Research Council, 1953.

Canada. Specifications. Canadian Government Specification Board, Ottawa, National Research Council

Canada. Housing Standards. Division of Building Research. Ottawa, National Research Council, 1958.

U.S.A. Classification, Library of U.S. Congress, Washington, U.S. Government Printing Office.

Standards Collections

American Concrete Institute. ACI Standards. Detroit, ACI.

British Standards Institution. Sectional List of British Standards. London, British Standards Institution, 1958/9.

Canadian Standards Association. Standards. Ottawa, CSA.

Specification Writers Association of Canada. Standard Specifications. Toronto, SWAC.

Periodicals

Haas, Harry. "'Office Standard' Specifications Document Brings Advantages". Progressive Architecture, August 1959, p. 13.

Holstrom, J.E. Classification of Classifications, F.I.D. 17th conference report, Vol. 1, 1947, p. 29-36.

Rosen, Harold J. "Organization of Specifications" Progressive Architecture, March 1959, p. 9-11.

A P P E N D I X B

OUTLINES OF CURRENT REPRESENTATIVE SYSTEMS.

APPENDIX B

OUTLINES OF CURRENT REPRESENTATIVE SYSTEMS.

AIA Filing System for Architectural Plates and Articles	1949
Ben H. Dyer, Specification Work Sheets	1951
Ben John Small, Streamlined Specification Standards	1952
National Building Code of Canada	1953
Reeve-Sleeper, Architectural Specifications	1955
Universal Decimal Classification	1957
Housing Standards, National Research Council	1958
AIA Standard Filing System	1959
Dewey Decimal Classification	1959
Goldsmith, Architects' Specifications	1959
Edwards, Specifications	1959
Canadian Government Specification Board	1960
American Society of Testing Materials	1960
Canadian Standards Association	1960
Sweet's Catalog	1960

AIA FILING SYSTEM FOR ARCHITECTURAL PLATES AND ARTICLES.

Q. RELATED TECHNOLOGY AND MATERIALS.

Q1 Structure (Theory, systems, methods, data)

Q2 Materials

Q2.1 Stone
Q2.2 Clay
Q2.21 Brick
Q2.22 Tile
Q2.23 Terra Cotta

Q2.3 Concrete
Q2.4 Plaster and Stucco
Q2.5 Metal
Q2.51 Iron and Steel
Q2.52 Bronze, Aluminum and other non-ferrous metals.
Q2.53 Special Alloys

Q2.6 Wood
Q2.7 Glass
Q2.8 Plastics and other synthetics
Q2.9 Paint
Q2.10 Terrazzo
Q2.11 Waterproofing
Q2.12 Insulation
Q2.13 Acoustical

R. EQUIPMENT

R6 Hardware

BEN H. DYER, SPECIFICATION WORK SHEETS (1951)

General Conditions
Special Conditions
Schedule of Drawings
Alternates
Demolition
Clearing and Grubbing
Excavating and Grading
Pile Foundations
Concrete Work
Masonry Work
Radial Brick Chimney
Exterior Stone
Architectural Terra Cotta
Waterproofing and Tile Drains
Structural Steel
Steel Joists
Cellular Steel Sub-Floors
Roofing and Sheet Metal
Miscellaneous Metal
Architectural Metal
Metal Doors and Trim
Metal Toilet Compartments
Metal Office Partitions
Steel Windows
Aluminum Windows
Metal Shelving
Steel Roof Decks
Gypsum Roof Decks
Carpentry and Millwork
Insect Screens
Lathing and Plastering
Ceramic Tile
Terrazzo
Interior Marble and Stone
Asphalt Tile
Linoleum
Rubber Flooring
Cork Tile
Wood Floors - Laid in Mastic
Acoustical Treatment
Insulation
Caulking
Glass and Glazing
Hardware
Toilet Room Accessories
Painting
Shades and Venetian Blinds
Curtain Tracks and Cubicles
X-Ray Protection
Incinerators
Plumbing
Heating
Air-Conditioning
Built-in Refrigerators
Electrical Work
Lighting Fixtures
Electrical Distribution
Elevators and Dumbwaiters
Pneumatic Tube System
Outside Utilities
Kitchen Equipment
Laboratory Equipment
Sterilizer Equipment
X-Ray Equipment
Movable Equipment
Site Approach Work
Landscaping

BEN JOHN SMALL, STREAMLINED SPECIFICATION STANDARDS (1952)

Contractual

Proposal Invitation
Proposal
Form of Agreement
General Conditions

Site Work

Demolition
Excavating, Filling,
Test Borings
Lawns and Planting

Structural

Carpentry
Cast in Place MSC Piling
Cellular Steel Floor, Roof
Composite Piling
Concrete
Concr.& Glass Bl.Roof Lights
H-Section Steel Piling
Precast Concrete Joists
Precast Concrete Piling
Precast Lightweight Con. Slabs
Structural Steel
Wood Piling

Masonry

Ext. Arch. Terra Cotta
Exterior Stone Work
Int. Arch. Terra Cotta
Masonry Mortars
Masonry Work

Weather Protection

Asb.Cem.Roofing & Siding
Caulking
Cement Stucco
Copper Roofing & Sh.M.Work
Dampproofing
Glass and Glazing
Metal Roofing and Siding
Roofing and Insulation
Tempered Glass Doors
Waterproofing.

Metal Work

Aluminum Work
Hollow Metal Work
Kalamein & Tin Clad Work
Miscellaneous Metal Work
Miscellaneous Specialities
Metals
Metal Toilet Partitions (I)
Metal Toilet Partitions (II)
Metal Windows
Movable Metal Partitions
Ornamental Metal Work

Finishing

Acoustical Work
Asphalt Tile
Cork Flooring
Elevator Work
Hardware
Hardware Allowance
Interior Marble Work
Lathing and Plastering
Linoleum Flooring
Painting
Refrigerator Work
Rubber Tile
Rubber Wall Covering
Structural Glass
Terrazzo
Tile
Toilet Room Accessories
Vinyl Plastic
Wall Covering Materials
X-Ray and Radium Prot. Work

4. DESIGN

4.1 General
.2 Foundations
.3 Wood
.4 Unit Masonry
.5 Plain Concrete
.6 Reinforced Concrete
.7 Steel
.8 Cladding

5. MATERIALS

5.1 Aggregates
.2 Aluminum
.3 Asbestos Cement
.4 Bituminous Materials
.5 Brass
.6 Cement
.7 Clay and Shale Units
.8 Compounds for joining
.9 Concrete
.10 Concrete Units
.11 Copper
.12 Cork
.13 Fasteners
.14 Glass
.15 Gypsum
.16 Insulation, Thermal
.17 Lime
.18 Masonry Units
.19 Mineral Wool
.20 Mortar and Plaster Ingredients
.21 Paper, Building
.22 Pipe and Pipe Fittings
.23 Protective Coatings and Wood Preservatives
.24 Refractories
.25 Sand
.26 Sand Lime
.27 Steel and Iron
.28 Stone, Natural
.29 Wood and Wood Products

REEVE-SLEEPER (1955)

1. General Conditions
2. General Contractor's Work
3. Demolition
4. Borings
5. Excavation and Preparation
6. Piles Site.
7. Masonry Materials
8. Concrete
9. Cement Finishes
10. Brick
11. Block and Tile
12. Glass Block
13. Stone
14. Flagging
15. Granite
16. Architectural Terra Cotta
17. Waterproofing
18. Dampproofing
19. Structural Steel
20. Steel Joists
21. Light Weight Steel Sections
22. Roofing and Sheet Metal
23. Miscellaneous Metals
24. Ornamental Metals
25. Metal Specialties
26. Hollow Metals
27. Metal Covered Wood
28. Rolled Metal Windows &Doors
29. Rough Carpentry
30. Exterior Finished Carpentry
31. Interior Finished Carpentry
32. Wood Stairs
33. Caulking
34. Lathing and Plastering
35. Interior Marble,Slate and Stone
36. Special Wall Finishes
37. Structural Glass
38. Wood Flooring
39. Terrazzo and Mosaic
40. Ceramic Tile
41. Rubber Tile and Sheet Rubber
42. Cork Tile
43. Asphalt Tile
44. Linoleum and Composition Tile
45. Linoleum
46. Magnesite Terrazzo
47. Magnesite
48. Undercoating Flooring
49. Glass and Glazing
50. Rough and Miscellaneous Hardware
51. Finishing Hardware
52. Bathroom Accessories
53. Painting and Decorating
54. Screens (Insect)
55. Weatherstrip
56. Window Shades
57. Venetian Blinds
58. Insulation, Thermal
59. Insulation, Sound Absorption
60. Insulation, Sound Transmission
61. Sewage Disposal
62. Drainage and Outside Sewers
63. Plumbing
64. Heating and Ventilating
65. Electric
66. Elevators.

UNIVERSAL DECIMAL CLASSIFICATION

2nd Edition, Revised 1957

691 BUILDING MATERIALS

691.1 Materials of organic origin
.11 Wood, Timber
.112 Hardwoods
.113 Softwoods
.12 Straw, reeds, bamboo, etc.
.13 Cork and cork substitutes
.14 Papers, Pulp and fibre-boards
.15. Other fibres
.16 Bituminous materials, Asphalt
.17 Rubber, plastics, similar material
.18 Materials of animal origin, Leather

691.2 Natural stones
.212 Granites
.214 Schists, Slates
.215 Limestones, Marble, Chalk, Travertine
.217 Sandstones
.22 Flint, sand, gravel (for aggregates)
.27 Asbestos, vermiculite, etc.

691.3 Artificial stone, Concrete, etc.
.31 Reconstructed, precast stone, Terrazzo, Gypsum boards
.32 Concrete Sand-lime bricks.
.322 Aggregates; lightweight, clinker
.327 Precast concrete products
.5 Asbestos-cement products
.33 Various agglomerates and compositions

691.4 Earth, Cob, Clay and ceramic products
.41 Dried earth, Adobe, Mud, Cob
.42 Heavy ceramic (burnt) clay ware
.421 Clay bricks
.424 Roofing Tiles
.43 Glazed, (semi) porous earthenware
.432 Salt-glazed ware generally
.434 Terracotta, whiteware, fireclay, etc.

691.5 Binding materials, Plasters, etc.
.51 Limes
.52 Sand, gravel, etc.: se 691.22
.53 Mortars
.54 Cements
.55 Plasters
.56 Plasterer's cements, Hard plasters
.57 Paints, distempers, varnishes
.58 Bedding (glazier's) putty, mastic
.59 Other bedding materials.

691.6 Glass
.61/62 Kinds of glass
.615 Sheet (pane) glass

691.7 Metals, Iron, Steel
.713 Cast Iron (pipes, etc.)
.714 Steel (girders, etc.)
.73/75 Copper, Lead, Zinc
.77 Light metals and alloys

691.8 Components, units of construction. Builders' hardware
.81 Prefabricated simple units generally.
.87 Reinforcement materials generally
.88 Fixing devices, Anchors, Ties, Dowels, Wedges, Nails, etc.

1 General Conditions
2 Definitions
3 Site Planning Requirements
4 Plans and Specifications
5 Space Requirements
6 Light and Ventilation
7 Fire Protection
8 Sound Insulation
9 Excavation and Back Filing
10 Unexcavated Areas
11 Footings
12 Foundation Walls
13 Houses Without Basements or Cellars
14 Concrete
15 Structural Steel Work
16 Basement of Cellar Columns
17 Drainage
18 Damp Proofing and Waterproofing Masonry Below Grade
19 Basement and Cellar Floors
20 Walkways and Driveways
21 Masonry Construction Above Grade (Excepting Veneer)
22 Masonry Veneer for Frame Construction
23 Frame Construction
24 Rough Carpentry Materials
25 Building Papers (Other than Vapour Barriers)
26 Chimneys and Flues
27 Fireplaces
28 Windows
29 Doors
30 Exterior Finish
31 Interior Trim
32 Stairs
33 Flooring
34 Kitchen Storage
35 Medicine Cabinet, Closet Shelving, etc.
36 Insulation (Thermal)
37 Vapour Barriers
38 Lathing and Plastering
39 Interior Finish Other Than Plaster
40 Stucco
41 Toilet Fittings
42 Roofing
43 Sheet Metal Work
44 Painting
45 Glazing
46 Plumbing
47 Domestic Hot Water
48 Water Supply
49 Heating
50 Electrical Work
51 Hardware
52 Garages and Carports
53 Site Improvement

AIA STANDARD FILING SYSTEM (1959)

1 Preparation of Site and Preliminary Work
2 Excavation and Filing
3 Masonry Materials
4 Concrete and Monolithic Construction
5 Brick Masonry
6 Foundations
7 Waterproofing and Dampproofing
8 Stone Work
9 Architectural Terra Cotta
10 Masonry Unit Construction, Hollow and Solid
11 Roads, Paving, Surfacing, Curbs, Gutters, Sidewalks
12 Roofing and Siding other than Wood, Sheet Metal and Skylights
13 Structural Metals
14 Miscellaneous Metal Work
15 Ornamental Metal Work and Metals in General
16 Doors, Windows, Frames, Trim and Accessories
17 Prefabricated Buildings and Materials used in Combination
18 Vaults and Safes
19 Carpentry, Lumber, Exterior Coverings, and Millwork
20 Furring and Lathing
21 Plastering
22 Marble and Other Natural Stones
23 Fill, Terrazzo, Wall Boards and Miscellaneous Floor and Wall
24 Plastics Finishes.
25 Paint, Painting and Finishing
26 Glass and Glazi ng
27 Hardware
28 Furnishings and Interior Decoration
29 Plumbing
30 Heating, Ventilating, Air Conditioning and Refrigeration
31 Electrical
32 Marine
33 Elevators, Moving Stairways, Dumbwaiters and Accessories
34 Power Plant
35 Equipment
36 Construction Plant
37 Insulation
38 Landscape Work
39 Acoustics
40 Codes, Standards and Construction Regulations
41 Architectural and Sculptural Models and Renderings

"Building" - Main Entries:

691 Building Construction Materials

.1 Timber
.2 Building Stones
.3 Concrete and Reinforced Concrete
.4 Ceramic and Clay Materials
.5 Masonry Adhesives
.6 Glass
.7 Structural Iron and Steel
.8 Other Structural Materials
.9 Other Building Materials

693-9 SYSTEMS OF BUILDING CONSTRUCTION

693 Masonry Construction

.1 Stone Masonry
.2 Stabilized earth construction (i.e. Brick)
.3 Tile and Terra Cotta Masonry
.4 Hollow Block Masonry
.5 Concrete and Reinforced Concrete Masonry
.6 Plaster and Lathwork
.7 Steel Construction
.8 Resistant Construction (i.e. thermal, sand, fire, rodent, shock, waterproof)
.9 Ice and snow construction (i.e. igloos)

694 Wood Construction

.2 Rough Carpentry
.6 Finish Carpentry
.7 Fine Joinery
.8 Stair Building

695 Roofing and Roofing Materials

.1 Wood Shingle
.2 Slate
.3 Concrete and Tile
.4 Metal (i.e. non-ferrous)
.5 Iron and Steel
.6 Composition Roofing
.7 Textile Roofing
.9 Other Roofings

698 Detail Finishing in Building Construction

.1 Painting
.2 Calcimining
.3 Wood Finishing
.5 Glazing and Leading Windows
.6 Paper Hanging
.9 Floor Coverings

GOLDSMITH (1959) - Suggested Trade Schedule

0. General Conditions and Supplementary General Conditions
1. Preparation of Site
2. Excavation, Filing and Grading
3. Foundations
4. (Materials for Mortar and Concrete)
5. Concrete
6. Brickwork
7. Stonework
8. Structural Terra Cotta - Block Construction
9. Architectural Terra Cotta
10. Paving, Curbing, Gutters, Vault Lights
11. Waterproofing - Dampproofing
12. Roofing, Sheet Metal Work, Skylights
13. Structural Steel
14. Miscellaneous Steel and Metal Work
15. Ornamental Metal Work; Stairs
16. Metal Doors, Windows and Trim
17. Vaults and Safes
18. Furring and Lathing
19. Plastering - Stucco
20. Marble, Slate, Structural Glass
21. Tile Work, Terrazzo
22. Composition Tile, Plastic and other Flooring (except Wood)
23. Framing and Carpentry
24. Millwork, Cabinetwork, Stairwork
25. Hardware
26. Glass and Glazing
27. Painting and Finishing
28. Furnishing and Decoration
29. Plumbing
30. Heating, Ventilation, Air Conditioning, Refrigeration
31. Electrical Work, Radio
32. Elevators, Dumbwaiters
33. Power Plant
34. Equipment
35. Lighting Fixtures
36. Insulation
37. Acoustics
38. Landscape

General
1. General Conditions
2. Special Conditions

Work Prior To Construction
3. Demolition
4. Earth Work
5. Piling
6. Caissons

Concrete and Masonry
7. Concrete
8. Masonry
9. Structural Glazed Units
10. Glass Block
11. Architectural Cast Stone
12. Architectural Terra Cotta
13. Limestone and Granite

Waterproofing and Dampproofing
14. Waterproofing
15. Dampproofing

Metal
16. Structural Steel
17. Miscellaneous Metal Work
18. Metal Stairs
19. Cellular Steel Floor
20. Industrial Steel Partitions
21. Hollow Metal Partitions
22. Mesh Partitions
23. Metal Toilet Partitions
24. Steel Windows
25. Aluminum Windows
26. Fire Doors
27. Hollow Metal Doors
28. Industrial Steel Doors
29. Steel Rolling Doors
30. Overhead Steel Doors
31. Vault Doors
32. Hangar Doors
33. Ornamental Metal Work
34. Aluminum

Wood and Hardware
35. Rough Carpentry
36. Finish Carpentry
37. Finish Hardware

Roofing
38. Roof Decking
39. Roofing and Sheet Metal
40. Cement Asbestos Roofing and Siding
41. Corrugated Metal Roofing and Siding

Miscellaneous Work
42. Structural Glass
43. Glass and Glazing
44. Caulking
45. Weatherstripping
46. Thermal Insulation

Interior Finish
47. Furring and Lathing
48. Plastering
49. Acoustic Treatment
50. Marble, Slate and Soapstone
51. Tile
52. Terrazzo
53. Accessories
54. Flooring
55. Wood Block Flooring
56. Plastics
57. Painting and Decorating

Special Equipment
58. Kitchen and Cafeteria Equipment
59. Laundry Equipment
60. Hospital Equipment
61. X-Ray Room
62. Casework and Laboratory Equipment
63. Post Office Equipment
64. Prison Cells
65. Gymnasium Equipment
66. Fire Escapes
67. Incinerators
68. Radial Brick Chimney
69. Cold Storage Rooms
70. Folding Partitions
71. Metal Lockers and Shelving
72. Venetian Blinds
73. Shades

Final Outside Work
74. Site Improvement
75. Paving
76. Lawns and Planting

Conveyors
77. Passenger Elevators
78. Freight Elevators
79. Electric Stairways
80. Dumbwaiters
81. Ash Hoists
82. Mail Chutes
83. Linen Chutes
84. Package Chutes and Conveyors
85. Monorails and Hoists

Mechanical

86. Plumbing
87. Sprinkler System
88. Compressed Air System
89. Pneumatic Tube System
90. Outside Utilities
91. Heating
92. Ventilating
93. Air Conditioning
94. Refrigeration
95. Electrical
96. Telephone System
97. Call System
98. Loud-Speaker System
99. Fire Alarm System
100. Outside Electrical Distribution

EDWARDS - Small Schedule

1. General Conditions
2. Earth Work
3. Concrete
4. Masonry
5. Waterproofing
6. Miscellaneous Metal
7. Rough Carpentry
8. Finish Carpentry
9. Roofing and Sheet Metal
10. Weatherstripping, Caulking and Glazing
11. Plaster and Stucco
12. Marble and Tile
13. Flooring
14. Painting
15. Plumbing
16. Heating
17. Electrical

CANADIAN GOVERNMENT SPECIFICATION BOARD
Index of Specifications 4 January 1960

Excerpt of Building Materials:

1 - GP Paints, Pigments and Related Commodities
9 - GP Paper Products
11 - GP Wood Fibreboard, Particleboard, and Related Products
12 - GP Glass
16 - GP Road Materials
19 - GP Putty, Caulking and Sealing Compounds
25 - GP Waxes and Polishes
34 - GP Asbestos-Cement Products
37 - GP Bituminous Materials for Waterproofing
56 - GP Miscellaneous Bituminous Materials and Related Products
58 - GP Silicone Masonry Water Repellents
59 - GP Standardization of Metal Gauges
69 - GP Builders Finishing Hardware.

AMERICAN SOCIETY OF TESTING MATERIALS (1960)

A Ferrous Metals
B Non-Ferrous Metals
C Cementitious, Ceramic, Concrete, and Masonry Materials
D Miscellaneous Materials
E Miscellaneous Subjects
F End-Use Materials

CANADIAN STANDARDS ASSOCIATION (1960)

A Civil Engineering
B Mechanical Engineering
C Electrical Engineering
G Ferrous Metallurgy
H Non-Ferrous Metallurgy
O Timber
S Steel Construction
W Welding
Z Miscellaneous

SWEET'S CATALOG 1960
Main Sections

1. Foundations
2. Structural Systems
3. Curtain Walls
4. Masonry
5. Wood
6. Metals
7. Glass, Plastics
8. Roofing, Siding
9. Masonry Treatments, Waterproofing
10. Thermal Insulation
11. Sound Control
12. Lath, Plaster, Wallboard, Trim
13. Flooring, Floor and Wall Covering
14. Surfacing, Paneling
15. Paints, Finishes, Protective Coatings
16. Doors
17. Windows
18. Hardware
19. Door, Window Equipment
20. Skylights, Roof Ventilators, Louvers
21. Store Fronts
22. Partitions
23. Furnishings, Special Equipment
24. Vertical Transportation
25. Residential Kitchen Equipment
26. Food Service Equipment
27. Bathroom, Washroom, Laundry Equipment
28. Waste Disposal, Cleaning Equipment
29. Pipe, Fittings
30. Water Supply, Drainage
31. Air Conditioning, Heating
32. Electrical Distribution
33. Lighting
34. Communication
35. Contractors, Special Services.

A P P E N D I X C

T E N T A T I V E C A T A L O G U E .

DIRECTORY OF ORGANIZATIONS QUOTED

AIA	The American Institute of Architects, 1735 New York Avenue N.W., Washington 6, D.C.
AISI	American Iron and Steel Institute, 150 East 42nd Street, New York, 17 N.Y.
ACI	American Concrete Institute, P.O. Box 4754, Redford Station.
AITC	American Institute of Timber Construction, 1757 K Street, NW., Washington 6, D.C.
ASA	American Standards Association Inc., 70 East 45th Street, New York 17, N.Y.
ASCE	American Society of Civil Engineers, 33 West 39th Street, New York 18, N.Y.
ASTM	American Society of Testing Materials, 1916 Race Street, Philadelphia, 3, Pa.
CCI	Calcium Chloride Institute, 909 Ring Bldg., 1200 18th Street N.W., Washington 6, D.C.
CGSB	Canadian Government Specification Board, National Research Council, Ottawa 2, Ont.
CRSI	Concrete Reinforcing Steel Institute, 38 South Dearborn Street, Chicago 3, Ill.
CS	Commercial Standards, Commodity Standards Division, US Department of Commerce, United States Government Printing Office, Washington 25, D.C.
CSA	Canadian Standards Association, 235 Montreal Road, Ottawa 2.
FS	Federal Specifications, General Services Administration, US Government, Standardization Division, Washington 25,D.C.
IFI	Industrial Fasteners Institute, 1517 Terminal Tower, Cleveland 13, Ohio.
MRDTI	Metal Roof Deck Technical Institute, 53 West Jackson Boulevard, Chicago 4, Ill.
NAMM	National Association of Metal Manufacturers, 228 North LaSalle Street, Chicago 1, Ill.
NCSA	National Crushed Stone Association, 1415 Eliot Place N.W., Washington 7, D.C.
NLMA	National Lumber Manufacturers' Association, 1319 18th Street N.W., Washington 6, D.C.
PCI	Prestressed Concrete Institute, 205 West Wacker Drive, Chicago 6, Ill.
PEI	Porcelain Enamel Institute, Inc., 1145 19th Street N.W., Washington 6, D.C.
SPR	Simplified Practice Recommendations, US Dept. of Commerce, National Bureau of Standards, Washington 25, D.C.
UL	Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago 11, Ill.

ABC
ABRIDGED
BUILDING
CLASSIFICATION

5 NATURAL SCIENCES

54 CHEMISTRY
542 Laboratories, Fittings and Equipment.

6 APPLIED SCIENCES, TECHNOLOGY

620.1 Testing of Materials
621.8 Machine Parts, hoisting and conveying machinery
.86 Means of lifting and transporting. Winches
.867 Conveyors
.876 Lifts. Escalators
.88 Means of attachment : 3.0

624 Civil Engineering
624.1 Earthwork. Foundations. Substructures
.13 Earthwork. Geotechnics
.131 Soil mechanics. Structural soil technology
.3 Examination of soil.
.38 Loading tests.
.133 Excavation
.15 Foundations (simple :0.1)
.155 Piles. Pile Driving
.157 Foundations under Water
.1 Cofferdam
.2 Open Caisson

625.7 Highway Engineering. Road Construction.
.8 Paving of roads and highways
.81 Primitive Roads
.82 Stone Paving (:1.18) , Brick Paving.
.83 Wood Paving. Cork Paving.
.84 Concrete Paving
.85 Asphalt Paving
.86 Crushed Stone Roads. Gravel Roads
.88 Curbs

69 BUILDING

69.03 "324" Construction in Winter
.057 (Contractor's Plant)
.059 Maintenance. Damaga. Reconstruction
.1 Maintenance. Exterior Cleaning
.6 Demolition

0.223 Curtain Walls.

Joints in Curtain Walls : School of Architecture, Princeton University.

Thermal Behaviour of Curtain Walls : idem.

Metal Curtain Walls Manual : NAAM

1.221 Monolithic Concrete

Building Code Requirements for Reinforced Concrete: ACI 318 ; ASA A 89.1

Recommended Practice for Measuring, Mixing and Placing Concrete : ACI 614

Recommended Practice for Selecting Proportions for Concrete : ACI 613

Manual of Standard Practice for Detailing Reinforced Concrete Structures. : ACI 315

Reinforced Concrete - A Manual of Standard Practice: CRSI

A Method of Proportioning Concrete for Strength, Workability and Durability: NCSA

1.6 WOOD

Modern Wood Structures : AITC

2.21 Precast and Prestressed Concrete

Tentative Recommendations for Prestressed Concrete: ACI-ASCE 323

2.43 Miscellaneous Ferrous Metal Installations

Code of Recommended Practice and Basic Design Specifications for Steel Roof Deck Construction: MRDTI

Curtain Walls of Stainless Steel : School of Architecture Princeton University.

Stainless Steel Curtain Walls : AISI

2.6 WOOD

National Design Specification for Stress-Grade Lumber and its Fastenings : NLMA

3.0 PARTS AND ACCESSORIES

Bolt, Nut and Rivet Standards : IFI

3.41 For Natural Stone

The Support, Anchorage and Protection of Exterior Marble Veneer Two Inches and Less in Thickness: ASA A 94.2

3.9 ADHESIVES

Terms Relating to Adhesives : ASTM D 907

Selection of Adhesives : AITC - Sa 11.06

5.235 Slabs

Minimum Standard Requirements for Precast Concrete Floor and Roof Units : ACI 711

5.45 Steel Wire Fabric

Design Manual; Welded Wire Fabric for Building Construction : WRI

8.131 Commercial Marble

Exterior Marble used in Curtain or Panel Walls :ASA A 94.3

8.255 Calcium Chloride

Calcium Chloride in Concrete: CCI Manual CM - 1

0.0 BUILDING ELEMENTS

0.1 FOUNDATIONS (simple building foundations)
Engineering Foundations : 624.1

0.2 WALLS, PARTITIONS, WATERPROOFING, DAMPPROOFING.
Wall Coverings : 0.5

.21 Basement and Earth Retaining Walls
(below dampproofing course)

.22 External Walls
(above dampproofing course)
Unit Masonry: 1.1; 1.2; 1.3
Carpentry : 1.6
Struct. Steel : 2.4

.221 Solid
.1 Combined materials

.222 Cavity
.1 Veneer

.223 Curtain

.23 Boundary and Party Walls

.24 Cross Walls, Buttressing Walls

.25 Stationary Partitions

Art Stone	:1.2; 1.3
Carpentry	:1.6
Metal Studs	:3.4
Steel Railings	:2.4
Alumin. Railings	:2.5

.26 Piers and Pilasters

Piers, Abutments	:624.1

.28 Waterproofing

Plaster Coat Method	: 1.2
Iron Coat Method	: 1.2
Membrane Method	: 1.7
Backed Copper Method	: 1.5

.29 Dampproofing
.291 Dampproofing below grade
.292 Dampproofing above grade

0.3 ROOFS, ROOFING

0.4 FLOORS, FLOORING

0.5 CEILINGS, WALL COVERINGS
Metal Suspension Systems : 3.4

.52 Acoustic Materials

.55 Wall coverings

0.6 SKELETON FRAMES

0.7 VERTICAL TRANSPORTATION

0.8 OPENINGS AND CLOSURES

.81 Movable Partitions
.82 Folding Partitions
.83 Railings and Gates
.84 Doors
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.86 Access Devices

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.91 Flagstaffs
Wood : 2.6
Metal : 2.4; 2.5

.92 Chimneys
Brick : 1.3
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Metal : 2.4; 2.5

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COMPONENTS

1.0 TRADE COMPONENTS

1.1 NATURAL STONE WORK

.11 Unit Masonry
Flagging : 625.82 (Stone Paving)

1.2 ARTIFICIAL STONE WORK

.22 Concrete
.221 Monolithic : CSA A23
.5 Rendering
.222 Unit Masonry

.23 Asbestos Cement

.24 Gypsum
.241 Monolithic
.5 Plaster
.242 Unit Masonry
.243 Sheet Work
.1 Plasterboard Work
.2 Lathing

.28 Waterproofing
.281 Plaster Coat Work
.282 Iron Coat Work

1.3 CERAMICS. GLASS

.31 Ceramic Unit Masonry
.311 Brick Work
.1 Reinforced Brick Work
.312 Structural Tile Work
.1 Reinforced Structural Tile Work
.313 Facing Tile Work
.1 Architectural Terra Cotta
.2 Wall Tile Work
.3 Floor Tile Work
.33 Quarry Tile Work

.32 Glass Unit Masonry

Spandrel Glass Work ;:2.3

1.4 FERROUS METAL WORK

.43 Ferrous Sheet Metal Work

1.5 NON-FERROUS METAL WORK

.53 Non-Ferrous Sheet Metal Work

1.6 CARPENTRY WORK

.61 Rough Carpentry

.62 Finish Carpentry
.621 Exterior
.622 Interior

1.7 BITUMINOUS WORK. LINOLEUM. CORK

.71 Waterproofing and Dampproofing
.711 Membrane Method

.72 Roofing
.721 Built-Up Roofing
.722 Shingle Roofing and Siding

.73 Flooring

.74 Cork Insulations

1.8 RUBBER AND PLASTICS

.81 Flooring
.811 Rubber Flooring and Sheeting
.812 Vinyl Tile and Sheet Applications

1.9 PAINTING

MATERIALS

1.5-1.9
TRADE
COMPONENTS

2.0 INDUSTRY COMPONENTS

2.1 (no literary warrant)

2.2 ARTIFICIAL STONE

.21 Precast and Prestressed Concrete
.211 Columns
.212 Beams
.213 Slabs
.1 monolithic units
.2 composite systems

Drainage systems below grade : 696.13

MATERIALS
2.0-2.8
INDUSTRY
COMPONENTS

2.3 CERAMICS. GLASS

.352 Glass Panels, Glass Doors, Mirror Installations
.353 Hermetically Sealed Double Glazing Units

Drainage systems below grade : 696.13

2.4 FERROUS METAL INSTALLATIONS

.41 Structural Steel Work
.43 Miscellaneous Ferrous Metal Installations

2.5 NON-FERROUS METAL INSTALLATIONS

.51 Structural Work
.53 Miscellaneous Non-Ferrous Metal Installations

2.6 WOOD

.611 Glued Laminated Timber Installations
.681 Doors
.682 Windows
.1 Wood sash and screen frames : CSA O 132.1
.691 Prefabricated Fittings
.693 Wood Furniture

2.7 (no literary warrant)

Drainage systems below grade : 696.13

2.8 RUBBER AND PLASTICS

.81 Plastic Domes

3.0 PARTS AND ACCESSORIES

.01 Expansion Shields, Expansion Nails, Drive Screw Nails : FF-S-325
.02 Wire Nails, Spikes and Staples : CSA G 111

3.4/5 METALS

.40 Rough Hardware

.41 For Natural Stone

.42 For Artificial Stone

.43 For Ceramics. For Glass

.44/45 For Metals

.46 For Wood

.47 For Bituminous Products

.48 For Rubber and Plastics

3.50 Finish Hardware

.51 Door Hardware

.511 Butts
.512 Locks
.513 Push and Pull Devices
.514 Automatic Devices
.515 Bolts
.516 Door Stops

.52 Window Hardware

.521 Sash Hardware
.522 Transom Hardware

.53 Screen and Storm Door Hardware

.54 Cupboard Hardware

.55 Miscellaneous Builder's Hardware

3.6 WOOD

.61 Wood Hardware

3.8 RUBBER AND PLASTICS

.815 Rubber-like gasket materials (Neoprene) : NAAMM
.825 Plastic gasket materials (Vinyl) : NAAMM

3.9 ADHESIVES

.91 Assembly Glues for Wood

.911 Animal Glue
- .1 Hide Glue
- .2 Extracted Bone Glue

.912 Casein Glue
- .1 Low Water Resistance
- .2 Medium Water Resistance
- .3 Incorporated toxic for mold resistance

.913 Urea Resin Glue
- .1 Cold Press Formulation
- .2 Hot Press Formulation
- .3 High Frequency Formulation

.914 Resorcinol Resin Glue
- .1 Cold Temperature Formulation
- .2 Medium Temperature Formulation
- .3 High Frequency Formulation

4.0 FINISHED PRODUCTS

4.2 ARTIFICIAL STONE

.21 Concrete

.211 Concrete Block with applied surface finish
.212 Asbestos-cement board with applied surface finish

.22 Gypsum

.222 Gypsum board with applied surface finish

4.3 CERAMICS. GLASS

.31 Ceramics

.311 Ceramic Glazed Structural Clay Facing Tile
Facing Brick and Solid Masonry Units :ASTM C126

.314 Pipe
.3 Clay Sewer Pipe, Glazed
.31 Standard Strength : ASTM C261
.32 Extra Strength : ASTM C287

.32 Glass

.321 Masonry Units
.2 Glass Block, Enamelled

.322 Sheets
.1 Spandrel Glass
.2 Mirrors, Silvered : CGBS 12-GP-5
.21 Type I A
.22 Type I B
.23 Type II
.25 Transparent Mirrors: CGSB-12-GP-6

4.4 FERROUS METALS

.41 Wrought Iron Sheets, Zinc Coated : ASTM A 163

.43 Zinc Coated (Galvanized) Iron or Steel Farm Field and Railroad Right-of-Way Wire Fencing : ASTM A 116

.45 Enameled Sheets : PEI

4.5 NON FERROUS METALS

.51 Aluminum with applied surface finishes

.511 Aluminum with electro-chemical surface finishes
.512 Aluminum with other applied surface finishes

Aluminum with mechanical or etched finishes :5.5/6.5

4.6 WOOD

.61 Plastic Applications

.611 Plastic coated doors
.612 Plastic coated or laminated preformed tops and sills
.613 Plastic coated or laminated plywood

.62 Asbestos-Cement Applications

.621 Asbestos-cement pressed wood-fibre laminations

4.7 BITUMINOUS PRODUCTS, LINOLEUM AND CORK PRODUCTS

MATERIALS
4.5-4.7
FINISHED
PRODUCTS

.71 Roofing and Siding Materials

.711 Asphalt Shingles Surfaced with Mineral Granules :CSA A123.1
.712 Asphalt Roofing Surfaced with Mineral Granules :CSA A123.2
.713 Asphalt Roofing Surfaced with Powdered Mineral Matter :CSA A123.3
.714 Wide Selvage Asphalt Roofing Surfaced with Mineral Granules :CSA A123.4
.715 Asphalt Roll Type Siding Surfaced with Mineral Granules :CSA A123.5

5.0 SEMI-FINISHED PRODUCTS.

5.1 NATURAL STONE - MASONRY UNITS

5.2 ARTIFICIAL STONE

.21 Reconstructed Stone

.211 Standard Specification for Cast Stone : ACI 704

.22 Sand-Lime

.221 Sand-Lime Brick ; CSA A82.3;
- .1 Grade SW
- .2 Grade MW
- .3 Grade NW

.23 Concrete

.231 Concrete Brick : ASTM C 55
- .1 Grade A
- .2 Grade B

.232 Concrete Block
- .1 Concrete Masonry Units, Hollow Load Bearing : ASTM C 90
- .2 Concrete Masonry Units, Hollow Non-Load Bearing : ASTM C 129
- .3 Concrete Masonry Units, Solid, Load Bearing : ASTM C 145

.233 Concrete Masonry Units for Construction of Catch Basins and Manholes : ASTM C 139

.234 Concrete Pipe
- .1 Concrete Sewer Pipe : ASTM C 14
- .2 Concrete Culvert, Storm, Drain and Sewer Pipe, Reinforced : ASTM C 76
- .3 Concrete Low Head Internal Pressure Sewer Pipe, Reinforced : ASTM C 362

.235 Slabs : ACI 711

.24 Asbestos-Cement Products

.241	Shingles	
.1	Asbestos Cement Roofing Shingles	:CGSB 34-GP-3a
.2	Asbestos Cement Siding Shingles	:CGSB 34-GP-4a
.242	Sheets	
.1	Corrugated	:CGSB 34-GP-5a
.2	Flat, Decorative	:CGSB 34-GP-14
.3	Flat, Flexible	:CGSB 34-GP-15
.4	Flat, Fully Compressed	:CGSB 34-GP-16
.5	Flat, Semi Compressed	:CGSB 34-GP-17
.234	Pipe	
.1	Sewer	:CGSB 34-GP-96

.25 Gypsum Products

.251	Masonry Units	
.1	Gypsum Partition Tile or Block	:CSA A82.25
.252	Sheets	
.1	Gypsum Wall Board	:CSA A82.27
.2	Gypsum Sheathing Board	:CSA A82.28
.3	Gypsum Lath	:CSA A82.24
.253	Slabs	
.1	Precast Reinforced Gypsum Slabs	:ASTM C 377

5.3 CERAMICS, GLASS, MINERAL INSULATION

.31 Ceramics

.311	Brick				
.1	Building Brick (Clay or Shale)				:CSA A82.1-1954:ASTM C62
.11	Grade SW				
.12	Grade MW				
.13	Grade NW				
.2	Facing Brick (Clay or Shale)				:CSA A82.7-1954:ASTM C62
		FBX	FBS	FBA	
.21	Grade SW	.211	.212	.213	
.22	Grade MW	.221	.222	.223	
.3	Refractory Brick				
.31	Refractories for Incinerators				:ASTM C106
.4	Sewer Brick (Clay or Shale)				:ASTM C32
.41	Grade SA				
.42	Grade MA				
.43	Grade NA				
.5	Paving Brick				:ASTM C7
.312	Chemical Resistant Masonry Units				:ASTM C279
.01	Grade H				
.02	Grade L				
.313	Tile				
.1	Wall Tile				
.11	Structural Clay Load Bearing				:CSA A82.4-1954:ASTM C34
.111	Grade LBX				
.112	Grade LB				
.12	Structural Clay Non Load Bearing -/				
.121	Grade NB /:CSA A82.4-1954: ASTM C56				
.2	Facing Tile				
.21	Structural Clay				:ASTM C212
.3	Floor Tile				
.31	Structural Clay				:ASTM C57
.314	Pipe				
.1	Drain				:ASTM C4
.2	Clay Flue Linings				:ASTM C315
.3	Clay Sewer Pipe				
.31	Standard Strength, glazed and unglazed				:ASTM C261: C13
.4	Clay Pipe				
.41	Standard Strength				
.411	Perforated				:ASTM C211
.42	Extra Strength				:ASTM C200
.43	Vitrified Clay Pipe and Fittings				:CSA A60-1953

.32 Glass

.321 Masonry Units
.1 Glass Brick
.2 Glass Block
.3 Glass Tile
.323 Glass Base Products
.1 Expanded Glass, Slabs

.33 Mineral Wool Thermal Building, Insulation

.331 Batts, Mineral Wool, Type I :CSA A101

5.4 FERROUS METALS

.41 Steel Joists

.411 Open Web Steel Joists and Open Web Nailer Steel Joists :SPR R94

.45 Steel Wire Fabric

.47 Steel Wire Mesh

MATERIALS
5.4
SEMI-FIN. PRODUCTS

5.6 WOOD PRODUCTS

.61	Piles	
.611	Round Timber Piles	:CSA A56; ASTM D25
.62	Dimension	
.621	Glued-Laminated Softwood Structural Timber	:CSA 0122
.622	Modified Wood	:ASTM 1324
.63	Blocks	
.631	Creosoted End Grain Wood Block Flooring for Interior Use	:ASTM D1031
.64	Plywood	
.641	Hardwood Plywood	:CSA 0115
.642	Lumber Core Plywood	:CSA 0115
.643	Douglas Fir Plywood and Western Softwood Construction Plywood	:CSA 0121
.65	Shingles and Shakes	
.651	Western Cedar Shingles and Shakes	:CSA 0118
.66	Particle and Fiber Board	
.661	Fiber Board, Insulating	:CGSB 9-GP-15
.662	Fiber Board, Hard Pressed	:CGSB 9-GP-16
.665	Particle Board, Building Construction	:CGSB 11-GP-1

5.7 BITUMINOUS PRODUCTS, LINOLEUM AND CORK PRODUCTS

.714	Pipe, Bituminized, Fiber, Drain and Sewer	:CGSB 56-GP-1
.75	Flooring Products	
.751	Asphalt Floor Tile	:CSA A100
.752	Linoleum Products	:CSA A146

5.8 RUBBER AND PLASTIC PRODUCTS

.85	Flooring Products	
.851	Vinyl Asbestos Floor Tile	:CSA A126

6.0 RAW PRODUCTS

6.1 NATURAL STONE

.11 Expanded Vermiculite
.12 Commercial Asbestos

6.3 CERAMICS, GLASS

.32 Glass
.322 Slabs and Sheets
.1 Door Glass
.2 Window Glass
.21 Plate
.211 Plain :CGSB 12-GP-3
.1 Flat Polished
.11 Silver Quality
.12 Mirror Quality
.13 Glazing Quality
.212 Treated
.1 Heat Tempered
.2 Wired
.3 Wind Glass
.22 Sheet
.221 Patterened :FS DDG 451 A
.1 Tempered
.2 Heat Absorbing :CGSB 12-GP-4
.222 Flat :CGSB 12-GP-2
.1 AA Quality
.2 A Quality
.3 B Quality
.223 Decorative Laminated
.224 Safety :CGSB 12-GP-1
.1 Laminated
.11 Bullet Resisting
.2 Heat Treated

.33 Mineral Wool :CSA A 101
Type II
Type III

6.4 FERROUS METALS

.41	Steel	:CSA G40
.411	Structural Steel	
.0	General Requirements for the Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Steel Use	:CSA G40.1
.1	Structural Steel, High Strength Low Alloy	:ASTM A242
.2	Nickel Steel, Structural	:ASTM A8
.3	Silicone Steel, Structural	:CSA G40.6
.4	Sheet Piling Steel	:CSA G40-7
.5	Medium Structural Steel	:CSA G40.4
.6	Low and Intermediate Plates Maximum 2 inches	:CSA G40.5
.412	Steel Bolting and Rivet Material	
.1	Structural Rivet Steel	:CSA G40.2
.11	High Strength	:ASTM A195
.2	Bolts and Nuts	
.21	Steel	:ASTM A325
.22	Alloy Steel	:ASTM A354
.413	Steel Wire and Reinforcing Materials for Concrete	:CSA G30
.0	Minimum Requirements for Deformation of Deformed Steel Bars	:CSA G30.6
.1	Billet Steel Bars for Concrete Reinforcement, Plain, Deformed	:CSA G30.6
.2	Rail Steel Bars, Plain, Deformed Cold Drawn Steel Wire	:CSA G30.3
.415	Steel Pipe and Tube	
.1	Pipe	
.2	Piles	
.416	Sheet and Strip Steel, Bars	
.417	Steel Castings, Steel Forgings	
.419	Welding Electrodes and Rods	
.42	Steel and Wrought Iron Products	:CSA G134
.43	Iron	
.431	Cast Iron	
.432	Malleable Iron	
.433	Wrought Iron	

6.5 NON-FERROUS METALS

.51 Brass

.511	Yellow Brass Castings for General Purposes	:ASTM B30
.512	Naval Brass Rods for Structural Purposes	:ASTM B21
.513	Forging Brass Rods	:ASTM B124
.514	Brass, Commercial and Naval Castings	:FS QQ - B-621
.515	Brass Castings (to be brazed	:FS QQ - B-601
.516	Brass, Commercial, Bars, Plates Rods, Shapes, Sheets and Strips	:FS QQ - B-611

.52 Bronze

.521	Castings	:ASTM B60;FS QQ - B-691a
.522	Bars, Plates, Rods, Shapes, Sheets, Strips	:FS QQ - C-501

.53 Aluminum

.530	General Specifications for Inspection of Aluminum and Aluminum Alloys	:CSA HA1
.531	Aluminum and Aluminum Alloy Plate, Sheet and Coil	:CSA HA 4
.532	Aluminum and Aluminum Alloy Bar, Rod, Wire and Extruded Shapes	:CSA HA 5
.533	Aluminum and Aluminum Alloy Rivet Welding and Brazing Rod and Wire	:CSA HA 6
.534	Aluminum and Aluminum Alloy Drawn Tubing (Seamless)	:CSA HA 7
.535	Aluminum Alloy Forgings	:CSA HA 8
.536	Aluminum Alloy Sand Castings	:CSA HA 9
.537	Aluminum Alloy Permanent Mould and Semi-permanent Moulded Castings	:CSA HA 10

6.6 WOOD

.61 Yard Lumber :CSA 0141

.62 Structural Timber :CSA 043

		Select Structural Grades	Select Structural Grade	Structural Grade
.621	Joists and Planks	.1	.2	.3
.622	Beams & Stringers	.1	.2	.3
.623	Posts & Timbers	.1	.2	.3

.65 Hardwood Veneers

6.7 BITUMINOUS RAW PRODUCTS

.711 Paper; Building Sheathing, Water Repellent (Breather Type) :9-GP-2

.712 Paper; Building, Vapor Barrier :9-GP-3

.713 Asphalt Saturated Roofing Felt for Use in Waterproofing and in Constructing Built-up Roofs:CSA A123.6

.811 Film and Sheathing, Flexible Vinyl :CGSB 41-GP-10

7.0 CONGLOMERATES AND MIXTURES

7.1 EXCAVATION MATERIALS

.11 Rock
.12 Earth

7.2 ARTIFICIAL STONE (Prepared Mixes)

.21 Prepared Drymix for Artificial Stone

.22 Concrete

.221	Ready Mixed Concrete	:ASTM C94
.222	Gypsum Concrete	:ASTM C317

.23 Mortars

.231	Mortar for Reinforced Brock Masonry	:ASTM C161
.232	Mortar for Unit Masonry	:ASTM C270
.235	Sulfur Mortar	:ASTM C287
.236	Chemical Resistant Mortars	:TN 4/11

.24 Grouts

.25 Plasters

.251	Gypsum Plaster	:CSA A82.22
.1	Neat Plaster	
.2	Gypsum Mill Aggregated Plaster	
.3	Gypsum Wood-Fibred Plaster	
.4	Gypsum Gauging Plaster	
.5	Gypsum Gauging Plaster for Finish Coat	

7.7 BITUMENS

.71 Asphalt

.711	Solid (hot application)	
.1	for dampproofing and waterproofing	:CGSB 37-GP-17
.11	Primer	:ASTM D41
.2	for use in constructing built-up roofing	:ASTM D 312
.21	Asphalt roofing primer	:CGSB 37-GP-9
.22	Asphalt roofing lap cement	:CGSB 37-GP-4
.3	Mastic asphalt for flooring	:CGSB 56-GP-6
.712	Cutback	
.1	for dampproofing and waterproofing	
.11	Unfilled	:CGSB 37-GP-6
.12	Filled	:CGSB 37-GP-16
.2	Roof Coating	
.21	Unfilled	:CGSB 37-GP-7
.22	Filled	:CGSB 37-GP-8
.5	Asphalt Cutback PlasticCement	:CGSB 37-GP-5
.7	Solvent Cutback Corrosion Preventive Compounds Petrolatum : 785	:CGSB 31-GP-1/4
.713	Emulsions	
.1	Emulsified Asphalt Compounds	
.11	for Dampproofing and Waterproofing	
.111	Soap Type	:CGSB 37-GP-1
.112	Mineral Colloid Type	:CGSB 37-GP-2
.12	Roof Coating; Asphalt Base Emulsions for Use as Protective Coating for Built-Up Roofs	:ASTM D 1227
.13	Chemical Type, for Mastic Flooring purposes, Cold Process	:CGSB 37-GP-27
	Hot Process 711.3	

.72 Tar

.73 Pitch

.731	Coal Tar Pitch for Roofing, Dampproofing and Waterproofing	:ASTM D 450
	Primer: .751	
.732	Coal Tar Pitch for Steep Built-Up Roofs	:ASTM D 654

.75 Creosote

.751 Creosote - Coal Tar Solution
.1 for Wood Preservation
.2 for priming coat with coal tar pitch in dampproofing and waterproofing :ASTM D41

.77 Bituminous Sewer Joint Compounds, Mineral Filled

.771 Hot Pour :CGSB 56-GP-2
.772 Cold Applied :CGSB 56-GP-4

.78 Petroleum Derivates

.781 Asphalts, Liquid Petroleum, for Road Purposes :CGSB 16-GP-1
.782 Asphalts, Emulsified for Road Purposes :CGSB 16-GP-2
.783 Asphalts, Cements for Road Purposes :CGSB 16-GP-3
.785 Petrolatum, Hot Application, Corrosion Preventive Compounds :CGSB 31-GP-5/7

7.8 RUBBERS AND PLASTICS

.821 Joint sewer pipe compound, plastic, hot pour :CGSB 56-GP-3

.85 Caulking and Glazing Compounds.

.851 Non-skinning compounds :NAAMM
.852 Non-skinning resilient preformed compounds :NAAMM
.853 Non-skinning non resilient compounds :NAAMM
.854 Two-part rubber base compounds :NAAMM
.1 Elastomeric caulking and glazing compound, chemical curing type, gun grade :CGSB 19-GP-3

7.9 PASTES AND LIQUIDS

.921 Putty, linseed oil type, for glazing :CGSB 19-GP-1

.95 Protective-Decorative Coatings

.951 Paints, Pigments and Related Materials :CGSB 1-GP

.97 Impregnating Materials

.971 Silicone Masonry Water-Repellent :CGSB 58-GP-1
.975 Wood preservatives (Creosote:75)
.975.1 Zinc Chloride
.11 Chromated Zinc Chloride
.111 Copperized Chromated Zinc Chloride
.2 Pentachlorophenol
.3 Tanalith

.99 Waxes

.991 Paste Wax :CGSB 25-GP-2
.992 Water Emulsion Wax :CGSB 25-GP-3

8.0 COMPOUNDS AND ALLOYS

8.1 NATURAL STONE

Definitions :ASTM C 119

.11 Granite

.111 Commercial Granite
- .1 Granite
- .2 Gneissic Granite
- .3 Granite Gneiss
- .4 Gneiss

.112 "Black Granite"

.12 Limestone

.121 Calcite Limestone
.122 Dolomite
.123 Magnesium Limestone
.129 Tavertine

.13 Marble

.131 Commercial Marble
- .1 Calcite Marble
- .2 Dolomite Marble
- .3 Magnesium Marble
- .4 Onyx Marble
- .5 (Travertine Marble)
- .6 Serpentine Marble
- .7 Verb Antique

.14 Greenstone

.15 Sandstone

.151 Bluestone
.152 Brownstone
.153 Conglomerate
.154 Freestone
.155 Quartzite

.16 Slate

.161 Roofing Slate :ASTM C 406

.17 (Granular)

.171 Gravel
.172 Sand
- .1 Sandblasting :CGSB 31-GP-421

.173 Silt

.18 (Fibrous)

.181 Asbestos

8.2 ARTIFICIAL STONE MATERIALS

.21 Water :in CSA A 23

.22 Cement

.221 Natural Cement :ASTM C 10
.222 Portland Cement :CSA A5; ASTM C 150
.1 Normal Portland Cement
.2 High Early Strength Portland Cement
.3 Sulphate Resisting Portland Cement
.4 Air Entraining Portland Cement :ASTM C175
.5 Portland Blast Furnace Slag Cement :ASTM C205

.223 Masonry Cement :CSA A8; ASTM C91
.1 Type H (for general use)
.2 Type L (where high strength mortar is not required)
.224 Slag Cement :ASTM C 358
.225 Keen's Cement :CSA A 82.26 ; ASTM C61

.23 Lime

.231 Quicklime for Structural Purposes :CSA A82.42; ASTM C5
.232 Hydrated Lime
.1 For Masonry Purposes :CSA A 82.43: ASTM C 207
.2 Hydraulic for Structural Purposes :ASTM C 141
.3 Finishing
.31 Normal :CSA A82.44; ASTM C6
.32 Special ASTM C206

.24 Aggregates

.241 For Masonry
.1 Mortar :CSA A82.56 ; ASTM C 144
.2 Grout ASTM C404
.242 For Concrete
.1 Coarse
.11 Crushed Stone
.12 Cinder
.13 Slag
.2 Fine
.21 Ottawa Sand
.3 Lightweight
.31 For Structural Concrete :CSA A23 : ASTM C330
.32 For Concrete Masonry Units : ASTM C 331
.33 For Insulating Concrete :ASTM C 332
.4 Fireproofing :CSA A23

.25 Admixtures

.251 Integral Waterproofing
.1 Paste Type
.2 Liquid Type
.3 Powder Type
.252 Mortar Colors
.253 Air Entraining Admixtures for Concrete :ASTM C 260
.254 Fly Ash
.1 For Use as an Admixture in Portland Cement Concrete : ASTM C 350
.2 For Use as a Pozzolanic Material with Lime : ASTM C 379
.255 Calcium Chloride :CGSB 15-GP-1 : ASTM D98

.26 Gypsum :CSA A 82.21 : ASTM C 22

.29 Cleaning Agents

.291 Hydrochloric (Muriatic) Acid :CGSB 15-GP-1

8.4 FERROUS METAL ALLOYS

.41 Stainless Steel

.411 Chrome Steel
.412 Chrome-Nickel Steel

8.5 NON-FERROUS METAL ALLOYS

.51 Brass

.511 High Brass
.512 Yellow Metal
.513 Low Brass
.514 German Silver

.52 Bronze

.53 Aluminum Alloys

.530 General Specifications for Inspection of Aluminum and Aluminum Alloys :CSA HA 1
.531 Aluminum Alloy Ingot for Remelting :CSA HA 3

.54 Monel Metal

.55 Nickel Silver

.59 Solder

.591 Soft Solder Metal :ASTM B 32
.592 Hard or Brazing Solder :ASTM B 64

9.0 ELEMENTS

9.4 FERROUS METALS

.41 Iron

.411 Cast Iron
.412 Malleable Iron
.413 Wrought Iron

.42 Steel

9.5 NON-FERROUS METALS

.53 Aluminum

.530 General Specifications for Inspection :CSA HA 1
.531 Unalloyed Aluminum Ingot for Melting :CSA HA 2

.54 Lead

.541 Pig Lead :ASTM B 29

.55 Copper

.56 Zinc

.57 Chrome

.58 Nickel

FABRICAT. (METHODS)

4.332.1 Installation of spandrel glass
.2 Installation of mirrors

4.771 Application of Asphalt shingles surfaced with mineral granules

5.210 Finishes of reconstructed stone
.1 plain
.2 hand rubbed
.3 brushed
.4 acid washed
.5 cut cast stone
.51 machine rubbed
.52 bush hammered
.53 machine tooled
.54 crandalled
.55 hand tooled
.56 sawed

5.232 Laying of concrete block
.235 Installation of prefabricated slabs
.241.1 Installation of asbestos cement roofing shingles
.242.1 Installation of corrugated asbestos cement sheets
.252.1 Gypsum Wallboard Application : CSA A 82.31
5.311 Brick laying
5.314.3 Recommended Practice for Installing Clay Sewer Pipe : ASTM C12
.321 Glass block installation

5.611 Pile driving : 624.155
.621 Installation of Glulam timber
Fabrication : (CSA); : 6.62
.631 Laying of wood block flooring

6.32 Glazing

6.4 Erection of structural steel (Fabrication:9.4)
.41 Recommended Practice for Hand Cleaning Structural Steel Surfaces : CGSB 31-GP -401

Recommended Practice for Power Tool Cleaning of Structural Steel Surfaces : CGSB 31-GP-402

Recommended Practice for Flame Cleaning of Structural Steel Surfaces : CGSB 31-GP-403

Recommended Practice for Blast Cleaning of Metal Surfaces : CGSB 31-GP-404

6.530 Aluminum Finishes

6.62 Fabrication of Glue Laminated Timber : CSA A 56

FABRICAT.
(METHODS)

7.22 Placing Concrete
.23 Mortar Work
.24 Grouting
.25 Plastering

.711.21 Recommended Method for Application of Asphalt Primer for Asphalt Roofing : CGSB 37-GP-15
.711.22 Recommended Methods for Application of Asphalt Lap Cement : CGSB 37-GP-10
.712.11 Recommended Methods for Application of Unfilled Asphalt Cutback Foundation Coating :CGSB 37-GP-12
.712.21 Recommended Methods for Application of Unfilled Asphalt Cutback Roof Coating :CGSB 37-GP-13
.712.22 Recommended Methods for Application of Filed Asphalt Cutback Roof Coating : CGSB 37-GP-14
.712.5 Recommended Methods for Application of Asphalt Cutback Plastic Cement : CGSB 37-GP-11
.713 Recommended Methods for Surface Application of Asphalt Emulsions : CGSB 37-GP-3

7.72 Recommended Methods for Application of Unfilled Tar Cutback Foundation Coating :CGSB 37-GP-22
Recommended Methods for Application of Coal Tar Cutback Plastic Cement : CGSB 37-GP-23
Recommended Methods for Application of Unfilled Coal Tar Cutback Roof Coating :CGSB 37-GP-24
Recommended Methods for Application of Filled Coal Tar Cutback Roof Coating :CGSB 37-GP-25
7.771 Recommended Methods for Application of Hot-Pour Sewer Pipe Joint Compounds : CGSB 56-GP-5
7.772 Recommended Methods for Application of Cold-Applied Sewer Pipe Joint Compounds : CGSB 56-GP-9

7.95 Painting

.971 Recommended Methods for Application of Silicone Base Masonry Water Repellent : CGSB 58-GP-2

.99 Waxing

FABRICAT.
(METHODS)

8.1 Finish of Natural Stone

.101.1 Smooth planer finish
.2 Sand-sawed finish
.3 Shot-sawed ripple finish
.4 Plucked planer finish
.102 Coarse Machine tooled
.103.1 Tooled
Four cuts per inch
Six cuts per inch
Eight cuts per inch
.2 Fine stippled finish
.3 Smooth machine rubbed
.104 Coarse bush-hammered finish
.105 Fine bush-hammered finish
.106 Smooth machine-rubbed hone finish
.107 Tooled by hand

8.4 Finish of Ferrous Metal Alloys

ABC
ABRIDGED
BUILDING
CLASSIFICATION

71 PHYSICAL PLANNING

712 Landscape Design. Parks. Gardens

.4 Planting Design. Vegetation
.6 Structural features

72 ARCHITECTURE[1]

725/727 Public Buildings

725.161 Post Offices
.191 Fire Stations
.24 Banks
.355 Cold Storage Buildings
.38 Garages
.5 Hospitals
.6 Prisons, Reformatories
.74 Swimming baths
.85 Gymnasia

726 Ecclesiastical architecture. Funerary architecture.

727 Buildings for education, science, art, etc.

.1 Schools
.5 Scientific laboratories

73 SCULPTURE

1. This section lends itself for the accommodation of building type equipment.