NOTES ON THE KEEPING OF SURVEY RECORDS

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It is a truism to state that the best field work is valueless unless it is adequately recorded but it is not always fully appreciated that the lasting quality of such work is considerably diminished unless it is stored in a manner permitting rapid and accurate recovery. It is further true to say that the best-kept Records Office has little value unless there is clear indication of what is contained therein; no matter how orderly and systematic the storage of records, one cannot search for a record unless one is aware of its existence. Finally the system applied is intended to outlast the designer who evolved it and so must be framed in such a general and obvious manner that it may be used freely and completely by any person with a reasonable knowledge of the relevant subject. Similarly, the record itself must be long-lived and particularly in tropical countries where material deterioration is rapid and the destruction risk is high, preservation presents a very real problem.

From these observations one can build up a framework upon which, with minor modifications, the organisation of any Records Office may be hung. Fundamentally the office must be systematically ordered and free of dead-wood to allow easy recovery; full details of the contents must be clearly indicated, and records must be stored in such a manner as to minimise deterioration and the risk of complete loss, while being sufficiently impersonal as to be in no way dependent upon any individual memory. That is, it must be:—

Systematic,
Live,
Self-explanatory,
Secure,
Impersonal.

These generalisations may apply to any office charged with the storage of business records of any nature; it is now necessary to express them with particular reference to survey records. To do this one must first consider the basic aims of survey, which are two fold, that is to say that all survey processes may be considered as steps to one of two end products which are themselves of course inter-dependent. These products are:—

(i) Recoverable fixed points the coordinates of which are known in a defined frame of reference (*i.e.* a frame the origin and orientation of which are known). These will normally be physical concrete pillars but may be coordinated photopoints.

(ii) Maps, which are the representation of detail, or plans which are the representation of land boundaries.

If these are accepted as the ultimate products then the system must be evolved with these as centre-piece, and the five generalisations derived above must be expressed in the language of survey, which may best be done by coining a number of guiding " principles ".

1. *The Principle of Progressive Processes.* The end products of a survey are arrived at by a logical succession of processes and consideration of the more important of these will immediately give the main headings under which survey records may be divided. Thus, a fixed point is arrived at by a succession of observations recorded in a field book; these observations form the raw material of a computation and this computation gives rise to co-ordinates, and as a by-product there should be a description of the nature and location of the permanent mark. From this it can be seen that the main headings under which this aspect of survey may be divided are:—

Field books,
Computations,
Co-ordinate registers,
Beacon records or a photopoint library.

Similarly, a map is arrived at by the use of fixed points to control either field detail sheets and plane tables or air photographs from which detail compilations are derived by machine or slotted template methods: this material is used as the basis of fair drawings on a stable medium from which printing

plates can be made and the plates are then used to produce an edition of printed copies of the map. These processes, with the possible addition of photographic reduction processes before fair drawing, apply to maps at atlas, topographic or township scales. Cadastral plans differ in that they are hand drawn direct from the co-ordinates and field measurements and may be regarded as a marriage of the two basic aims. The main headings of this aspect of survey are thus:—

Field sheets or photo-compilations,
Fair drawings,
Record copies of printed sheets,
Cadastral plans, etc.

Various other modifications and additions within the scope of Survey records are clearly necessary and these will include:—

(i) Revision material, to ensure that maps once printed are kept up to date.

(ii) Cadastral plans which will be stored in an ordered manner keyed to the system of land division currently obtaining in the country.

(iii) Libraries of both books and maps which must be built up for reference purposes and to accommodate work done by other authorities which is relevant but does not fall within the scope of the system devised. If a library is defined as an " orderly collection of material containing useful and relevant data " it may also be used to cover such material as reconnaissance and similar data for uncompleted work.

(iv) History files which should be opened in some ordered manner (*e.g.* one for each printed map) to ensure that there is a record for future reference of what has been done in the past in a continuing process such as mapping.

These constitute the divisions into which the records will fall.

2. *The Principle of the Standard Unit.* In countries covering a large area where uncertainties and duplications of place names are prevalent it is necessary to devise a system whereby the approximate location of a point may be defined quickly and unambiguously. This may be achieved by the use of either geographical or projection co-ordinates but such a system is cumbersome to the point of being unmanageable when applied to registers. It may be done on an administrative boundaries basis but it is extremely difficult to arrive at an optimum size of unit which is not dependent upon local knowledge. The most satisfactory system is one based upon the ordered numbering of units of area defined in terms of latitude and longitude (*e.g.* half degree graticules); if this produces an unwieldly number of units then a double system may be necessary (*e.g.* an alphabetical ordering of two degree graticules each containing sixteen numbered units). The important thing in this connection is to define an unambiguous system of obvious simplicity with units of reasonable size.

The standard unit, once defined becomes the key to the records system. Map sheet lines must be defined in terms of the standard unit and the unit number must be quoted in, or at least obviously connected to, each pillar number. From this it follows that registers will be kept in accordance with the standard unit numbering system and further that computations are best filed under a system which links them quickly and easily to the standard unit. Revision material will be stored in a system linking it to the printed maps and thus to the standard unit; beacon records will be stored under the same system as the points are numbered and thus be related to the standard unit system. This concept leads immediately to the next two principles.

3. *The Principle of the Unique Informative Pillar Number.* Each fixed point which has been emplaced must be given a unique number and this number should be in a system designed to give the maximum information at a glance. It is a source of amazement how often this principle, which appears to be self-evident, is ignored in practice. At a minimum the number should indicate the standard unit in which it falls, a code letter defining the method by which it was fixed, and a serial number within the previous two definitions.

4. *The Principle of Cross-indexing.* As has been shown, the records for a given piece of work will fall into a number of the main heads into which the

records have been divided. It is of the greatest importance that all the pieces of a given job are so cross-indexed that each shows the identification numbers allocated to the others and reference to the number of the relevant end product. Clearly the simplest way to do this is to link all to a common factor and this will be the standard unit numbering system.

5. *The Principle of the Use of Subject Indices or the Avoidance of Uncontrolled Serialisation.* There is an unfortunate tendency when evolving a new records system to place far too much reliance upon accession numbers or the use of datal succession. These all too quickly result in cumbersome and time-wasting serialisations or alternatively dependence upon the individual memory. It is necessary to get outside what is essentially a parochial attitude and create a system into which any record can be fitted without modification into the indefinite future and not to be content with the immediate present. When one reaches, for example, computation number 2576 one wishes for a general classification which would immediately define the nature and location of the survey. What is required is a system which allows the separation of different aspects of survey into separate sections. Thus, all secondary trig computations would be stored together and further broken down in terms of their relationship to the standard unit system as expressed by location or numbering of the pillars involved. Provided the subject index is defined with care, overlapping can be kept to an absolute minimum.

6. *The Principle of Supersession.* One key to ensuring rapid recovery of a required record is to ensure that the office contains vital data only. This implies a continuous process of assessment and weeding out. As data are superseded or lose their value they must either be transferred to an archives section or destroyed and the tendency to accumulate material just because it is there, without considering its usefulness, must be overcome. The criterion must be whether the cost of re-observation is greater than the value of the time spent in storage and recovery. However a word of warning is necessary. Assessment in this sense is a rather specialised business and it is advisable when there is any doubt to keep the record concerned. If space permits, an Archives or Dead Records section is preferable to outright destruction, provided it can be organised in a manageable form and is not merely a lumber-room. Another aspect which must be considered when assessing is the ultimate historical importance or interest value of the record and this presents another argument in favour of an Archives.

7. *The Principle of Preservation by Separation.* There is a tendency to facilitate search by storing all the relevant pieces of a job together, *e.g.* field books, computations and plans bound in one file jacket, but there is a danger inherent in this method that, in the event of destruction or loss, this loss will be total. The solution lies in separating the various parts into different storage sections and evolving a comprehensive cross-indexing system which enables all parts to be related at sight. There is now a large variety of storage methods; if finances permit the best are steel cupboards, plan chests and filing cabinets built up of small units, but such facilities can only guard against fire and deterioration and it is of equal importance to implement an efficient system of issue and receipt which does not allow a record to be lost or even to be lost sight of. This can be done by a system of signature slips which are destroyed when the record is returned. For the best results this should be supplemented by a system of filing sheets whereby a sheet with a protruding tag is put in the place of the issued record. This allows a quick reading of what records are out and also considerably speeds up replacement on return. The questions of safe storage and quick recovery have been greatly simplified by the introduction of micro-film and other new techniques which present their own peculiar problems but which are generally much easier to handle once the cost of the initial installation has been met. Problems of publication and reproduction of results also come within the scope of this heading and the criterion here is that no material should leave the office which cannot be replaced from material that is retained. For example, when forwarding photo-points only one of a marked stereo pair should be allowed to leave the office, or abstracts of field books may be issued while the field books themselves are retained. Photocopying techniques have greatly simplified this problem and should be used as widely as possible. The record office cannot be regarded as complete until it has its own photocopying and

microfilm processing equipment.

8. *The Principle of Non-Individuality.* Any system of record keeping must be evolved by one person and it is inevitable that that person's memorising habits are inherent in the method. This must be borne in mind by the creator who must subjugate natural tendencies to a generalised system as far as is humanly possible. Thus one person may prefer a pictorial representation while a second prefers lists of figures and a third prefers widespread labelling, and the only solution, if the system is to survive the creator, is to introduce a fully cross-indexed system which makes use of all available methods. There is a very real risk of material being lost sight of unless this is done.

9. *The Principle of Publication.* It has been stated already that the records are of little value unless the subject matter is well-known or obvious. It is not enough to assume that people will know what to ask for. The query " Do you have any maps?" addressed to a Survey Department is a failure in public relations which occurs all too frequently. There are various means available of indicating what is contained in the Records Office, the three commonest being a key diagram or wall map, a register or catalogue and a card index. It is possible to express any item of contents in one of these forms. The aim in this case is to display the maximum information in its simplest form by a combination of these methods such that all available information in a given area or on a given subject or of a given nature is indicated with the minimum of search. For example, map availability should be shown by a key diagram of the sheet lines overprinted on a suitably scaled base map with different publication scales indicated by a colour code, supported by a comprehensive catalogue giving full data about each published sheet and a material record of a vertical plan cabinet containing a copy of every published sheet lavishly labelled; the whole ordered in accordance with the standard unit system of numbering referred to above.

These principles outline a general system which must be modified in the light of local conditions. In general it is important to realise that record keeping does not involve any flights of brilliant intellect, it calls for patience, perseverance and above all an orderly common-sense intelligence. A sense of purpose will be achieved when it is appreciated that record-keeping is not " the rooting about through dusty old files which should have been thrown out years ago " but is the active, essential, integrating centre from which the technical branches of a department stem.

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During November of this year a number of surveyors from this province were in Ottawa attending a Colloquium on Survey Education and we talked with surveyors from practically every province in the Dominion. Our province is probably in the lead with a certification program, but we are not the first province to have an organized technician group. The difficulty in the other provinces where there is such a group is that the organizations to which the technicians belong are not organizations which were sponsored by the land surveying associations. Oh how they wish they had our opportunity.

Much is to be done between now and the Annual Meeting, but it is hoped it can be done and we will be able to make a formal presentation of the charter to the technician executive at the Annual Meeting.

I feel that a standing ovation for this new association will not be out of place.

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Chairman of Committee on Certification
and Education of Survey Technicians
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