

CANADIAN FARM BUILDING PLAN SERVICE

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The Canadian Farm Building Plan Service was organized to develop and produce working drawings for the construction of farm service buildings and related labor saving equipment and to present information on the design of service buildings in relation to management, labor requirements and other factors affecting livestock and crop enterprises.

The Plan Service was initiated and has been co-ordinated by the National Committee on Agricultural Engineering, made up of agricultural engineers from the Federal and Provincial Departments of Agriculture and Agricultural Colleges in Canada.

Early Efforts to Develop a Plan Service

The establishment of a co-ordinated plan service covering farm buildings and facilities was recommended by the National Committee on Agricultural Engineering at the inaugural meeting of the N.C.A.E. at Ottawa in 1944. This was envisioned in some quarters as a co-operative exchange of plans among Federal and Provincial institutions. A sub-committee on Farm Buildings was set up by the N.C.A.E. to study the problem of creating a plan service and liaison was made with National Housing, established under the National Housing Act of 1944.

The Farm Buildings Sub-Committee met in 1945 at the Experimental Farm, Swift Current, Sask., to consider available farm housing and service building plans. Plans adopted included five for farm houses, two for farm workshops, two for grain storage, two for cattle and horses, two for pigeries and plans for certain livestock equipment. It was proposed that these plans be redrafted at the architectural office of the Experimental Farms Service. To handle the work, three positions were established in the following year, for this drafting office but were never filled due to the scarcity of qualified draftsmen and the inadequacy of salaries that could be offered. By 1949, even with the limited staff time available, five housing plans had been drafted, together with plans for two general purpose barns, a farm workshop, a brooder house and three pieces of poultry equipment. These were not sufficient to start a plan service and no particular funds were available for distribution of these

plans. In 1949, some ten preliminary farm housing plans were published under the auspices of the Prairie Rural Housing Committee supported by the Governments of the Prairie Provinces and Central Mortgage and Housing Corporation. An urgent need for farm housing plans had thus been partly met.

A New Approach

In 1951 the Eastern Section of the N.C.A.E. set up a sub-committee to collect and report on farm building plans available in Eastern Canada. Some 446 plans were collected, of these 26 related to farm buildings and 243 to barns, as reported to the Second Conference of the N.C.A.E. held at Ottawa in 1952. Provincial representatives at the Conference were asked what type of farm building plans were most urgently required in each region. This indicated the classes of service building plans required and that plans for farm housing was not an urgent problem.

At the 1953 meeting of the Western Section of the N.C.A.E. it was proposed that the preparation of service building plans be undertaken on the basis of eight separate classes of buildings with a sub-committee for each class. At a meeting of the Eastern Section of the N.C.A.E., which followed shortly, the Executive of the N.C.A.E. named the nucleus of Plan Committees for Beef Cattle, Dairy Cattle, Swine, Sheep, Poultry, Grain Storage, Fruit and Vegetable Storage and Machinery Storage and Miscellaneous, subsequently designated Special Structures.



Catalogues of plans published by the Canadian Farm Building Plan Service.

Two members were appointed to each plan committee, with power to add livestock and other specialists, with a view to preparing a catalogue of plans covering their particular

class of buildings. Drafting Service was to be provided at the Ontario Agricultural College and the Experimental Farm, Swift Current. Subsequent arrangements were made for drafting to be done at the Central Experimental Farm thus making three drafting centres available.

Support For The Program

The proposed program was submitted to the Executive of the National Advisory Committee on Agricultural Services, representing all Departments of Agriculture and the Agricultural Colleges, in May 1953 and authorization secured to collaborate with representative Animal Husbandmen and other groups in compiling data with respect to the proposed building plan service. By August 1953 it was possible to report to the National Advisory Committee that nearly all plan committees had completed membership arrangements, actually more than forty persons were involved, that progress had been made in the assembly of plan material and that the Publications Committee had agreed to certain drafting practices for the preparation of plan catalogues and plans. In November 1953 sample copies of a catalogue on Beef Cattle Housing were presented to a meeting of the National Advisory Committee, to illustrate the type of material proposed for the co-operative plan service. The drafting and printing of this material had been supervised and financed by the Ontario Agricultural College. The meeting stressed the necessity of all plans being approved by top animal authorities and other specialists so that the interested agencies would be committed to the job prior to publication and that publication and financing be cleared through both Federal and Provincial Departments of Agriculture. It was agreed that the drafting work be continued at the three drafting centres, that the drafting staff meet to arrive at a uniform basis of procedure and that the Engineering Committee should continue with the preparation of the additional classes of catalogues with supporting plans as proposed.

At a meeting of the Executive of the National Advisory Committee in April 1954 it was decided that the Federal Government would undertake to edit and publish the plan catalogues in English and French and

would finance the printing of the initial plan series on the understanding that the distribution of plans would be carried out through provincial organizations. Thus, after almost ten years of effort, official approval and financial support was secured for the Canadian Farm Building Plan Service.

Plan Catalogues and Supporting Plan Preparation

Support for the program gave impetus to the preparation of material for the third Conference of the N.C. A.E. held at Macdonald College in June 1954. This meeting received reports on the work of the eight plan committees, suggestions for improvement of plans; worked out procedures for the drafting centres; discussed the matter of revisions or maintaining of up to date material and learned from the Information Service of the Canada Department of Agriculture that provision had been made whereby the Department would pay for printing and distribution of catalogues to a central office in each Province; would underwrite the cost of printing the initial set of plans and that the plans would be made available to the provincial distribution centres on order through the Information Service or directly from the Distribution Division, Publications Branch, Queen's Printer, Ottawa.

Copies of the first catalogue printed, that of Beef Cattle Housing and Equipment, were distributed in quantity to all Provincial Departments of Agriculture in May 1955 and the first order for plan sets was received by the Information Service on June 14, 1955. The six plan catalogues printed to June 2, 1958 total 170,000 copies of which over 100,000 copies of these catalogues have been distributed to Provincial offices. Approximately 400,000 copies of the plan sets for these catalogues have been printed.

Reproduction copies of the catalogue on Special Structures have been reviewed by Provincial Departments and the final manuscript is being completed. Material for the catalogue on Grain Storage has been drafted and the manuscript is ready for preparation of reproduction copies for circulation and approval prior to printing. The preparation phase for all proposed plan catalogues is thus practically completed and arrangements have been made for supervision and drafting of material for future revisions at the Ontario Agricultural College.

The Plan Catalogues and Plan Sets

The following may serve to indicate the extent and type of information available in the various catalogues.

1. Beef Cattle Housing and Equipment

This catalogue contains a selection of plans for two designs of loose housing barns, a two-storey barn with overhead storage and a closed barn with ground storage. Three styles of cattle sheds are depicted with feed lot or corral and 21 pieces of beef cattle equipment.

2. Dairy Cattle Housing and Equipment

This catalogue is divided into two sections, one section deals with standard stall barns varying in size from 12-16 stalls; 18-28 stalls and 30-60 stalls. Designs are shown for a single row stall barn with 12-16 stalls and a general purpose barn with 4-10 stalls. A milk house and two types of silo are also shown.

The second section presents designs for loose housing barns in size ranges of 12-18 cows, 18-28 cows, 30 cows and 30 to 40 cows along with a design for a milking room unit and bull housing with yard. In addition, some 12 pieces of dairy cattle equipment are illustrated.

3. Swine Housing and Equipment

Danish and Canadian hog barns are shown in sizes suitable for 100-120 market hogs and a general purpose barn for sows and feeder hogs. Three types of colony houses are shown. Two types of sun shades are shown and some 25 items of feeding and other labor saving equipment.

4. Sheep Housing and Equipment

Designs are shown for a round roof sheep barn of 400 sheep capacity, a gable roof barn for 300 sheep and a pole barn with 14' bents each suitable for 40 sheep and a winter's supply of hay and straw. Inexpensive feeding sheds and lambing shelters are depicted together with sheep yards, corrals and pens. Some 20 items of sheep equipment are shown, including dipping tanks, feeders, and wool handling equipment.

5. Poultry Housing and Equipment

This catalogue contains designs for a one-storey laying house for 1700 birds; a two-storey house for 4000 birds and a four-storey laying house for 6800 birds, together with smaller laying houses for 1000-2000 birds and a cage laying house for 1600 birds. Designs are also given for a slatted floor

laying house, a rigid frame house for 1000 birds and a laying house for 400 birds. A two-storey broiler house is shown; barns and sheds for turkeys, colony houses and a range shelter. There are designs for 11 items of poultry equipment and designs for ventilation systems.

6. Fruit and Vegetable Storages and Equipment

This catalogue contains designs for fruit packing and storage buildings in sizes suitable for 100-200 tons of fruit, a bank type potato storage for 11,000 bushels and an above ground potato storage for 35,000 bushel capacity. A 3,000 bushel fruit and vegetable storage is shown, together with a design for a basement storage, a walk-in cooler and freezer and ventilation systems for storages. Three items of equipment are depicted.

7. Grain Storage and Equipment.

When available this catalogue will contain designs for approximately 20 types and sizes of storage, such as, small portable and permanent graneries, circular plywood graneries in 22,000, 33,000 and 44,000 bushel capacity, driveway type storages; grain storage buildings convertible to machine or animal shelter and 5000 and 10,000 bushel crib type farm elevators.

Also shown will be various types of corn cribs, a drive-through storage and a combination corn storage and drying building of 2,500 bushel capacity, together with temporary types of grain storage and locations for storage loading and unloading equipment.

8. Special Structures and Equipment

The final catalogue in the series will contain some ten plan categories, including three designs for motor vehicle storage, a closed frame and pole type machinery storage and workshop and a fuel tank shelter. There will be two designs for honey houses, tobacco buildings such as a kiln and a pack barn and tobacco handling equipment. Small animal buildings such as kennels, mink and fox pens will be shown as well as plant growth buildings of the greenhouse type, with hot beds and cold frames. Designs will be shown for other facilities such as a septic tank, a cistern and a drainage outlet. In addition, designs will be shown for some 14 items of equipment for farmstead and grounds improvement varying from swings to trellises, picnic tables, and an incinerator with spark arrestor, a shed for garden tools, a work bench, a breeze-way and a fence style.

From the above listing it is evident that the Plan Service covers a comprehensive range of designs for farm service buildings and associated equipment. In addition each catalogue contains a section dealing with management factors for the particular class of buildings in relation to features of building design and selection of equipment.

Distribution of Plan Service Material

Some confusion appears to exist in respect to public distribution of catalogues and plans. This has been due to a statement in the first four catalogues published, that is, Beef Cattle, Dairy Cattle, Sheep and Fruit and Vegetable Storage that catalogues may be had from Experimental Farms or the Canada Department of Agriculture, Ottawa. This statement has been amended in the Swine and Poultry Housing catalogues to read "copies of this catalogue may be had from Agricultural Representatives of Provincial Department of Agriculture". The reason for this change is that each Provincial Department of Agriculture either inserts a supplement or preferably stamps the catalogue with a statement on how and where to

order plans within the particular province. Any catalogues that are to be made available to the Public through Federal Agencies should be so stamped by the Provincial Department of Agriculture.

Revision of Plan Service Material

As indicated, arrangements have been made for the work of revision for the eight classes of plan catalogues to be supervised by the one remaining drafting centre at the Ontario Agricultural College. It is anticipated that revisions may proceed at the rate of one or two catalogues per year by insertion of additional sheets in the catalogues where this is practical or a revision of the catalogue when necessary. The drafting centre staff have, in recent weeks, met with representatives of Provincial and Federal Departments of Agriculture to discuss various details of the plan service including the demand for specific plans, additions, deletions and revisions. If this work goes according to plan the material presently available should be brought up to date every four to five years.

In conclusion, the development of

the Canadian Farm Building Plan Service has proceeded by four to five year stages. Early efforts from 1944-1949 to establish the service failed to secure sufficient support to launch a co-ordinated program of farm housing period from 1951 to 1954, a redirection of emphasis on farm service buildings only with more complete coverage for the proposed plan service gained widespread support due to the improvements in the proposed plan and possibly that the times were more receptive to the idea. In any event, official sanction and financial support were forthcoming. In the period 1955-58 all eight proposed plan catalogues and plan sets have been prepared. Six of these have been published and it is anticipated that the two remaining catalogues will be available by the end of 1958 or early 1959.

The fact that available plan service material has had reasonably widespread public distribution has, in the opinion of many, amply justified the establishment of the service and has given considerable gratification to the National Committee on Agricultural Engineering and all those associated with the development.

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most suitable. In tracer applications moderate penetration and high detection efficiency are generally desirable; in this case radioactive isotopes emitting β -rays are often used.

Units and Measurements

A beam of x- or g-radiation is measured by its ability to ionize air. The property measured is called the *exposure dose*, and the unit is the *roentgen*. Crudely speaking, a roentgen of x-radiation gives rise to one electrostatic unit of ionization in each cubic centimeter of air. Rotengens are a measure of the radiation itself, not what it does in, say, tissue.

The biological effects of radiation are assumed to be governed by, among other things, the amount of energy absorbed per unit mass at the place of interest, i.e., by the *absorbed dose*.

One unit of absorbed dose is the *rep* (rotengen-equivalent-physical), defined as the amount of energy absorbed per gram of tissue exposed to one roentgen of x-radiation. This corresponds according to the most recent values of certain constants, to about 95 ergs/gm. Unfortunately different authors have used different variations of the above definition, and values of

84 and 93 erg/gm are common in literature. This confusion has been resolved by defining a new unit, the *rad*, which is unambiguously equal to 100 erg/gm.

Rads (and reps) can be applied to electrons and neutrons as well as to x- and g-rays.

Exposure dose in roentgens is determined either by a free-air chamber, in which the ionization in a well defined volume of air is measured, or from the ionization in a small air-filled cavity surrounded by walls resembling air in composition. Absorbed dose can be determined in a variety of ways. In principle an attractive method is to measure the rise in temperature due to the energy absorbed in a small, isolated volume of the medium, but in practice the difficulties are very great. The ionization in a small gas-filled cavity at the point of interest can be interpreted in terms of absorbed dose. The exposure dose outside the medium can be measured and the absorbed dose at a point within deduced from the known behaviour of the radiation in the material. Other methods depend on the blackening of film, chemical changes in a vial of solution, and the change in colour of special kinds of glass. These latter methods depend on previous calibration against a device cap-

able of absolute measurement.

The shielding of radiation sources so that they do not harm those using them always requires consideration. G-ray sources require the most shielding, since the rays are penetrating and are emitted continuously in all directions. β -rays can be stopped completely by a thickness of material equal to the range. Accelerators present fewer problems, since the radiation is generally emitted in a directed beam, and the machine can be turned off when not in use.

Finally, a few words about the amounts of radiation involved in typical applications may be helpful. In tracer work it is only necessary to have enough radiation to detect, and a few millionths of a roentgen can be detected quite readily. On the other hand most irradiation effects require somewhere between a few thousand and several million roentgens. (Sprouting in potatoes is most effectively prevented by an exposure to twenty thousand roentgens.) The danger level to man lies between these two extremes: it is believed that he can be exposed to a tenth of a roentgen every week of his life without noticeable harm, but 500 roentgens at one time will kill him. In this respect men are evidently more sensitive than potatoes.