



R E P O R T

together with

M I N U T E S O F E V I D E N C E

relating to the proposed erection of an

ADMINISTRATIVE BUILDING FOR THE ENTOMOLOGY

AND PLANT INDUSTRY DIVISIONS

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

AT CANBERRA.

1946-47-48.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

PARLIAMENTARY STANDING COMMITTEE
ON PUBLIC WORKS.

REPORT

RELATING TO THE PROPOSED ERECTION OF AN

ADMINISTRATIVE BUILDING FOR THE ENTOMOLOGY
AND PLANT INDUSTRY DIVISIONS, COUNCIL
FOR SCIENTIFIC AND INDUSTRIAL RESEARCH
AT CANBERRA.

By Authority :

L. F. JONHATON, Commonwealth Government Printer, Canberra.
(Printed in Australia.)

MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.
(TWELFTH COMMITTEE.)

SENATOR CHARLES ADCOCK LAMP (Chairman).

Senate.

- (*) Senator CHARLES HENRY BRAND.
- Senator RICHARD HARRY NASH.
- (*) Senator NEIL O'SULLIVAN.

House of Representatives.

- WILLIAM PATRICK CONELAN, Esquire, M.P.
- (*) HENRY BAYNTON SOMER GULLETT, Esquire, M.P.
- (*) HOWARD BEALE, Esquire, M.P.
- JOHN BROOKE HOWSE, Esquire, M.P.
- DONALD McLEOD, Esquire, M.P.
- GEORGE JAMES RANKIN, Esquire, M.P.
- EDGAR HUGHES DEG RUSSELL, Esquire, M.P.

(*) Resigned 6th June, 1947.
October, 1947.

(*) Appointed 6th June, 1947.

(*) Ceased to be Member of the Senate 30th June, 1947.

(*) Appointed 24th

EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES,
No. 88, DATED 29th OCTOBER, 1947.

8. PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS—REFERENCE OF WORK ADMINISTRATIVE BUILDING AT CANBERRA FOR THE COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.—Mr. Lemmon (Minister for Works and Housing) moved, pursuant to notice, That, in accordance with the provisions of the *Commonwealth Public Works Committee Act 1913-1936*, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for investigation and report, viz. :—The erection, at Canberra, of a three-storied building to accommodate the administrative staff of the Divisions of Economic Entomology and Plant Industry of the Council for Scientific and Industrial Research.

Mr. Lemmon having laid on the Table plans in connexion with the proposed work—

Question—put and passed.

CONTENTS.

SECTION I.

Introduction	Paragraph in Report.
Present Proposal	1
Description of the Building	5
Estimated Cost	6
	7

SECTION II.

General	8
Necessity for the Building	9
The Future Building Programme	10
The Administrative Block	11
The Architecture	14
The Roof	16
Windows	17
Entrance Hall	18
Fire Risk	19
Elevator	20
Effect on Housing—	
Materials	21
Bricks	22
Tiles	23
Hardware	24
Labour	25
Output	26
Priority in Building	27
Estimate of Cost	28
Services	29
Use of Day Labour	30
Experimental Stations	31
Completion of Work	34

SECTION III.

Summary of Committee's Decisions	35
--	----

LIST OF WITNESSES.

Bayne, O. A., Assistant Director, Commonwealth Experimental Building Station, North Ryde, Sydney	Paragraph in Evidence.
Dickson, B. T., Chief Executive Officer of the Council for Scientific and Industrial Research, Canberra	204-228
Fleming, J., Chief Mechanical Engineer, Department of Works and Housing, Melbourne	83-115
Isaacs, D. V., Director, Commonwealth Experimental Building Station, North Ryde, Sydney	54-65
Jenkins, J. R., Secretary of the Australian Capital Territory Branch of the Building Workers Industrial Union	204-228
Canberra	
Limburg, D. E., Assistant Director of Works, Department of Works and Housing, Canberra	194-203
Morris, W. H., Architect, of Peddle, Thorp and Walker, Sydney	145-166
Nicholson, A. J., Chief of the Division of Economic Entomology of the Council for Scientific and Industrial Research, Canberra	227-231
Oliphant, K. H., Architect, Canberra	66-87
Phillips, H. W., Director of Architecture, Department of Works and Housing, Melbourne	116-144
Richardson, A. E. V., Chief Executive Officer of the Council for Scientific and Industrial Research, Melbourne	31-53
Somes, F., Executive Officer of the Building Workers Industrial Union, Canberra	1-30
	167-193

THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

ADMINISTRATIVE BUILDING FOR ENTOMOLOGY AND PLANT INDUSTRY DIVISIONS, COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH AT CANBERRA.

REPORT.

The Parliamentary Standing Committee on Public Works to which the House of Representatives referred for investigation and report the question of the erection of an Administrative Building at Canberra for the Council for Scientific and Industrial Research, has the honour to report as follows:—

SECTION I.

INTRODUCTORY.

1. The first steps for the establishment of a Commonwealth organization to carry out scientific industrial research were taken in 1916, and a temporary Advisory Council of Science and Industry was appointed. In 1920 this body became the Institute of Science and Industry under the directorship of the late Sir George Knibbs. Subsequently, by the *Science and Industry Research Act 1920-26*, the Council for Scientific and Industrial Research was established early in 1926.

2. Since that time the establishment has continued to grow and expand, and a great many projects have been taken in hand as opportunities arose to secure suitable staff and room to accommodate them. Outstanding results in many instances have been achieved, and increasing demands are being made upon the organization to carry out research on a great number of very pressing problems affecting a large variety of Australia's activities.

3. In 1929 the proposal to erect two laboratories and an administrative block for the Division of Economic Botany and the Division of Economic Entomology was referred to the Parliamentary Standing Committee on Public Works. In due course the Committee presented its report to Parliament and the proposal was approved, but, owing to financial restriction shortly after that time, although the laboratories were erected, the administrative block was deferred.

4. The result of the restricted building programme made it necessary for the administrative and clerical portion of the work to be carried on in a section of the laboratory space which was temporarily converted for office use.

THE PRESENT PROPOSAL.

5. The proposal now referred to the Committee is for the erection of a building which will connect the two existing laboratories on a plan similar to the original, but slightly altered to include a basement with special rooms for constant temperature work. There will also be a floor to house library racks.

DESCRIPTION OF THE BUILDING.

6. The overall dimensions of the building will be 74' 4" by 80' 7". There will be a Lower Ground Floor, Ground Floor, First and Second Floors, having a total floor space of 22,568 square feet.

A space of 18 feet on each side of the proposed building will be occupied by connecting passages, staff rest rooms and lavatories.

ESTIMATED COST.

7. The estimated cost of the building and its services is:—

Building Services—	£
Stormwater and sewerage	608
Electrical installations	10,150
Roads, paths, &c.	100
Mechanical installations	11,000
Total	21,858
	72,258

SECTION II.

COMMITTEE'S INVESTIGATIONS.

GENERAL.

8. The Committee inspected the site and the existing buildings in Canberra, studied the plans, and took evidence from those responsible for the planning of the project. A visit was also made to Sydney where evidence was taken from Mr. W. H. Morris, the Architect who was responsible for the original plan, and from Mr. Isaacs, Director of the Commonwealth Experimental Building Station at North Ryde.

NECESSITY FOR THE BUILDING.

9. The fact that the Committee had approved the original project in 1929, although subsequent financial stringency had prevented completion of that proposal, was sufficient to show that a necessity exists for some such building. An inspection of the congested conditions of the existing buildings served to emphasize to the Committee that work of great importance to Australia was being hampered and delayed. Consideration was therefore concentrated upon the question of whether or not this is the appropriate time to commence the erection of the building, especially in view of the importance of using all available material and man-power for the housing programme.

THE FUTURE BUILDING PROGRAMME.

10. The Committee was greatly interested in the sketch, drawn in 1928, which was produced by the Assistant Director of Works in Canberra, as it illustrated clearly the comprehensive group of buildings which was envisaged for the complete Council for Scientific and Industrial Research establishment in the years to come. It showed that the two existing laboratories were originally intended to be connected by just such a central structure as is now planned, thus completing one unit which would be duplicated at a later date by a similar unit on the same alignment. These two units would be sufficiently separated that there would be room for a large and imposing main administrative block, set back from the alignment of the laboratories and built upon the axis of University Avenue, giving a balanced and pleasing result when the whole scheme is complete. The plan also contemplated the gradual erection, at appropriate times, of subsidiary buildings on the remainder of the building area, and some of these have already been erected for use as insectaries, and control plots for insect and plant research.

THE ADMINISTRATIVE BLOCK.

11. It was explained at the outset that the building at present proposed is designed to meet the requirements of the Divisions of Entomology and Plant Industry at present in Canberra, and the floor space would be allocated in the proportions of 58 per cent. scientific activity, 20 per cent. clerical offices, and 22 per cent. for services. Evidence was tendered which emphasized the fact that the main administration of the Council for Scientific and Industrial Research, which is at present housed in Melbourne, would remain in that city for the present, and would not occupy any part of the proposed structure.

12. The Committee was interested to note that the scheme as originally visualized contemplated the eventual transfer to Canberra of the complete central administration of the Council for Scientific and Industrial Research, which would be housed in the main administrative block to be built in the future. Evidence given on this point at present, however, does not appear to be so explicit. Some of the witnesses were strongly of the opinion that it is necessary when possible to do so, for the complete administration to be transferred to Canberra, but on the other hand, the view was advanced that the administration could be better managed in a capital city.

13. The Committee has always been keenly interested in the planning of Canberra and its future progress, and has consistently recommended the adoption of plans which conform to the city design. It has also urged the early development of the various schemes which will help to complete the undertakings, conceived in the past but delayed for different reasons as the years have gone by. The Committee therefore considers that the erection of the proposed section of the buildings should be dependent upon and subsidiary to, the main scheme to be completed in the future, and that the policy of transferring the central administration to Canberra should be proceeded with when buildings can be made available and suitable opportunities arise.

THE ARCHITECTURE.

14. It was felt by the Committee that the architecture of the proposed building, connecting the two existing laboratories of plain and rather severe design, would present a front elevation of monotonous and uninteresting appearance. The length of the two laboratory blocks, with their high, closely spaced windows, seemed to demand a central block with some contrast and with some distinctive or dominating feature to make the final structure aesthetically pleasing and

satisfactory. It was pointed out, however, that, even when this structure is complete, it will only be one of several blocks in the whole scheme, and it must therefore be designed in such a way that it will be subsidiary to the future administrative building which is to contain architectural features to dominate the whole group. With this in mind it is recognized as necessary that the present building shall be of a somewhat subdued design, even if it lacks all that might be desired aesthetically, pending the completion of the remainder of the master plan.

15. As the present design contains provision for a front porch with wings standing out some three feet on either side, terminating in a wrought iron balustrade, and also, as the trim round the windows is to be of heavily moulded freestone, it was considered that the front openings would be quite prominent. However, it has been suggested that the parapet could be emphasized by the use of a similar freestone treatment. This part of the structure would then be distinctive enough to give the impression of completeness without detracting from the effect desired for the dominant feature of the ultimate group scheme. The Committee therefore recommends that the coping round the parapet should be of freestone.

THE ROOF.

16. Trouble has arisen from time to time with the flat roof on the present laboratories, but evidence in regard to the present project shows that the roof will be sloped, but will not show above the parapet.

WINDOWS.

17. The windows are to be of steel frames and, owing to the unsatisfactory performance of those at present in use, information was sought by the Committee as to the cause of the trouble, with a view to making provision against it in future. The architects assure the Committee that properly installed steel frames are now completely satisfactory and any trouble experienced in the past must have been due to faulty construction.

ENTRANCE HALL.

18. The floor of the Entrance Hall is planned to be of wood block construction suitably wax polished, and the Committee gave consideration to this provision, both from the point of view of saving timber, and also of providing a floor of lasting quality and non-slippery surface. The Committee is of opinion that, if the Entrance Hall is paved with terrazzo it will match the stairs, will prove more durable than wood blocks, will be less slippery to walk on, and will save a certain amount of timber which is in short supply in Canberra. The cost of terrazzo is stated to be approximately the same as a waxed wood block floor, and the Committee therefore recommends that the floor of the Entrance Hall be of terrazzo.

FIRE RISK.

19. Some doubt was expressed as to whether the stairways would be sufficient for such a long building, when the laboratories were connected by the central block, in case of fire. However, it is considered that, with the existing stairways at the end of each laboratory and the stairway provided in the central block, sufficient exits will be available in the event of fire.

ELEVATOR.

20. The Committee considers that difficulty and inconvenience will be occasioned to the staff if some kind of lift is not provided to give access from the Lower Ground Floor to the Library, and it is understood that a lift was provided in the original plan. Although most of the staff will be accommodated on the Ground and First Floors, it will no doubt be necessary for a considerable amount of movement from the constant temperature rooms on the Lower Ground Floor to the upper floors and the Library, and for the carriage of apparatus and books. It is therefore recommended that the provision of a small goods lift, either in the stair well or at some suitable point, be discussed further with the Council for Scientific and Industrial Research authorities before construction of the building commences.

EFFECT ON HOUSING.

21. *Materials.*—Special attention was paid to the question of the effect which this building would have upon the progress of housing construction in Canberra, and evidence was taken from several witnesses with this in mind. The Committee was informed that the materials to be used in the construction of this building have largely been decided having regard to restriction in the use of materials used for housing purposes. Consequently the number of items which will have an appreciable effect on the housing programme is reduced to a minimum, and the position is apparently improving so far as most materials are concerned. The main effect of this building upon housing will be caused by the use of steel reinforcement, plumbing materials, and hardware.

22. *Bricks.*—Bricks of excellent quality are manufactured in Canberra and no difficulty is anticipated in supply, as there is at present a reserve stock of 800,000 bricks, and production exceeds present demands. In addition a new concrete block machine has been obtained and this will have an output equivalent to 200,000 bricks per month.

23. *Tiles.*—Tiles for roofing are probably the most difficult bottle-neck at the present time, and many homes are held up until roofs can be provided for them. With the speeding up of tile manufacture, and the recent commencement of the production of suitable concrete tiles for roofs, the general position for roofing materials should improve shortly. As the Council for Scientific and Industrial Research building will not require any roofing tiles it is not likely to compete with housing in this regard.

24. *Hardware.*—Hardware, fittings, sinks and other plumbing materials are difficult to obtain and it is likely to be some time before manufacture will catch up with the demand. However, it is anticipated that shortages can be overcome to some extent by substitution of sizes, and in some cases by substitution of the materials themselves.

25. *Labour.*—The construction of this building will of necessity have some effect on the labour required for the construction of houses, but only to a minor degree. In the early stages it will comprise largely excavation and concrete work. It is anticipated that a structure of this nature will possibly attract a building organization from outside the Australian Capital Territory which, when the building is complete, would probably be available for housing construction.

26. *Output.*—Output of labour was stated as being of considerable importance in the housing programme, and evidence was taken from witnesses in regard to the conditions under which work is being carried out in Canberra. The output per man was criticized on one hand, while the efficiency of administration was considered at fault on the other hand. The Committee gave an opportunity for representatives of various sections to present their views, and the evidence obtained was illuminating and valuable. It was emphasized, in evidence, that no action was taken by Unions to limit output, but on the contrary special action had been taken by Union officials in Canberra with a view to co-ordinating all efforts to speed-up the erection of houses. No doubt a great deal can be achieved if those concerned give consideration to both sides of this evidence, and efforts are made to profit by the points shown as needing attention.

PRIORITY IN BUILDING.

27. The Committee took evidence with a view to ascertaining the feeling of local residents on the question of absolute preference for housing, and it is noticeable that there is a growing feeling that, as the position grows better with regard to materials, it is becoming more necessary to adopt a balanced building programme. It is realized that if, in several years' time, the housing lag is overtaken, we could easily have difficulty in some other phase of public activity, causing a lag which could prove almost as serious as the housing shortage. Priority in building is still regarded as important, and, with first priority given to the erection of housing, it is considered that attention should now be given to a balanced programme of building so that all the needs of the community shall be catered for. After the first demand for homes to shelter the people it is necessary to provide secondly for shops to supply them with food, and thirdly with places in which they can work. All these three categories are urgently needed in Canberra and a balanced plan is required.

ESTIMATE OF COST.

28. The estimate of the cost of the building itself, exclusive of services, was set down at £50,000, and it appeared that this was too high a figure for a building of this size and of comparatively simple construction. However, evidence taken in Sydney indicated that, if allowance is made for a slightly higher cost of building in Canberra than in Sydney, this estimate would be in keeping with present-day costs. The Committee was assured that the estimate had been carefully calculated having regard to present conditions and that, in view of such conditions, it is regarded as reasonable.

SERVICES.

29. The estimate of £21,858 for services is high in comparison with the figure for the building, but it is mostly composed of electrical and mechanical installations of a highly technical and expensive nature, and cannot therefore be compared with estimates for services for office buildings. It is not possible to estimate these items very accurately, owing to lack of actual details of prices at this stage, and the electrical engineers have allowed a considerable margin for contingencies. This is a matter which should be carefully reviewed when further details are available.

USE OF DAY LABOUR.

30. Inquiries were made as to the advisability of using day labour on this building. It was revealed, in evidence, that day labour is at present being used in Canberra on cottage construction because it has been found difficult to obtain tenders from contractors for such buildings. It was stated that many of the bigger firms are looking for work on major buildings rather than housing which is so exacting in detail in every way. From the point of view of the department it was considered that the present day labour organization was only equipped for housing construction, and acquisition of heavy gear would be necessary if that method were to be adopted for large buildings. It was stated that the day labour jobs were proving somewhat more expensive than contracts at the present time. However, representatives of the labour organizations stated that, for the reasons stated in evidence, such as continuity in supply of materials and labour, certain improvements could be introduced to make the day labour work in Canberra more effective and help to improve the comparison between the contract and day labour methods.

EXPERIMENTAL STATIONS.

31. A visit of inspection was paid to the Materials Research Station at Highett, Victoria, and to the Commonwealth Experimental Building Station at North Ryde, New South Wales. The Committee was very impressed with the work being carried out at these stations and with the co-operation which exists between the Victorian Station, established by the Council for Scientific and Industrial Research, and the New South Wales station maintained by the Department of Works and Housing. The work carried on at Highett, although less spectacular than that at Ryde, is providing most valuable data concerning strengths and uses of many materials at present in use for building, or which may be of use with advantage in the future, and deals generally with the development, manufacture, properties and uses of building materials.

32. The Research Station at North Ryde deals particularly with design, construction, performance and equipment in the field of building and related engineering. Much is done by experiment and test to establish the value of new methods, to develop new tools or equipment to suit particular purposes, and to encourage the mechanization of building work. Collaboration by the stations allows the full use of the research results to be tested in actual experiments at Ryde, where results of far reaching importance are being attained in a large number of fields affecting practical building operations. The Committee feels that a great deal of credit is due to the scientists in both stations for the enthusiastic manner in which they are applying scientific methods in establishing efficient systems of building to replace the trial and error methods of the past.

33. Results have at time proved surprising, and have indicated that certain methods regarded as essential for many years are unnecessary or even erroneous. It has been found, accordingly, that results which have been amply proved scientifically and demonstrated experimentally are sometimes accepted reluctantly by those responsible for the actual erection of buildings.

However, as builders and architects become convinced of the soundness of the methods recommended, and as the benefits become better known, the value of these stations will grow and their work will be more apparent and effective. Details of the work achieved and at present being performed were tendered in evidence to the Committee. They will be an indication of results accomplished and a pointer to a valuable source of information to those concerned with the multitude of problems associated with building in its varied forms. No doubt when the results receive more publicity they will be increasingly availed of with benefit to the country as a result.

COMPLETION OF WORK.

34. It was stated, in evidence, that it was expected that a period of approximately two years would elapse before the building was completed. The Committee, after reviewing the evidence, is of opinion that it is expedient to carry out the work as soon as it can be put in hand.

SECTION III.

SUMMARY OF CONCLUSIONS.

35. (1) It is expedient to carry out the work. (Paragraph 34).
- (2) The housing position in Canberra is improving and it is an appropriate time to begin construction of urgently needed public buildings in a balanced programme of development. (Paragraph 27).
- (3) The appearance of the entrance should be improved by the use of freestone to the coping of the parapet. (Paragraph 15).

- (4) Consideration should be given to the installation of a goods lift from the Lower Ground Floor to the Second Floor. (Paragraph 20).
- (5) The floor of the Entrance Hall should be of terrazzo which will match the stairs and save hardwood. (Paragraph 18).
- (6) The building proposed should be subsidiary to the main block to be erected on the axis of University-avenue in the future when the central administration is transferred to Canberra. (Paragraph 13).

CHARLES A. LAMP,
Chairman.

The Office of the Parliamentary
Standing Committee on Public Works,
Parliament House,
Canberra, A.C.T.

11th February, 1948.

EVIDENCE ON ENTOMOLOGY AND PLANT INDUSTRY ADMINISTRATIVE BUILDINGS, CANBERRA.

(Taken at Melbourne.)

SATURDAY, 22ND NOVEMBER, 1947.

Present:

Senator LAMP (Chairman).

Senator Nash.	Mr. McLeod.
Senator O'Sullivan.	Mr. Russell.
Mr. Conelan.	

Dr. Arnold Edwin Victor Richardson, Chief Executive Officer of the Council for Scientific and Industrial Research, sworn and examined.

1. To the Chairman.—I am aware that the Committee is inquiring into the proposal to erect an administrative building for the Council for Scientific and Industrial Research at Canberra. In my opening comment, I would paraphrase Churchill's famous comment on the Battle for Britain by saying that never in the history of the Council for Scientific and Industrial Research have so many people been so inconvenienced by lack of space for so long a time as have our colleagues at Canberra. I believe that the Committee will see at Canberra that there has been intense congestion in the Divisions of Plant Industry and Economic Entomology. In 1929, the Public Works Committee decided that there should be two laboratories in the block established at Canberra, with an administrative building between them. The buildings for the Divisions of Plant Industry and Entomology were erected, but then there was a depression and the project for the construction of the central block remained in the air.

In order to indicate the requirements of the Council for Scientific and Industrial Research, I refer the Committee to the growth of its various staffs at Canberra. In 1930-31, there were 34 research officers and technical officers at Canberra and nineteen other personnel, a total of 53. In 1938-39, there were 57 research officers and technical officers and 71 other personnel, a total of 128. In 1947-48 there are 88 research officers and technical officers, to which number will be added twelve more. Approval has been given for the additional twelve appointments, and the vacancies are being advertised. This will bring the number of research officers and technical officers up to 100. There are 138 other personnel, making a grand total of 238. Therefore, the buildings erected in 1929 to provide for 53 officers, are now required to provide accommodation for 238 officers.

There has been a corresponding development at other stations, as I shall show. In 1930-31, the Council for Scientific and Industrial Research Canberra Divisions had only six officers outside of Canberra. By 1938-39, that number had increased to 21. The total now is 128. These officers are stationed at various places from Katherine and Ord River in the north down to Tasmania, and from the Burdekin River across to the south-west of Western Australia. We have stations in every State. The two divisions—Plant Industry and Entomology—now have staffs totalling 356, as compared with only 53 in 1929.

We soon found, even during the depression, that there was justification for erecting the central building that was originally planned, but it was very difficult, in view of the grave financial conditions, to secure

approval even for current expenditure, much less capital expenditure. However, we did persuade the Government of the time to consider a plan for the erection of a portion of the front of the proposed building in order to provide much-needed accommodation. In 1938-39, tenders were called for, but then the international situation was very grave and the Treasurer at that time, Mr. R. G. Casey, directed the deferment of the scheme notwithstanding the seriousness of our position.

In 1946, we directed the attention of Mr. Dedman to our requirements. We submitted a memorandum in August of that year recommending the construction of a central block to provide 23,250 square feet of floor space. We pointed out that this was needed for the administrative offices of the two divisions located at Canberra, for expansion in the records and clerical staffs, for the library, and particularly for special controlled-temperature laboratories. The estimated cost of the building required was then £60,000, and provision was made in the estimates last year for that expenditure. The Minister approved of that on the 20th August, 1946, subject to giving final approval when tenders had been called and prior to signing any contract. In other words, he gave us authority to proceed with the construction of a building to cost £60,000 after having made a very careful investigation of the details.

At this stage, I submit to the Committee a document prepared by Dr. B. T. Dickson, Chief of the Division of Plant Industry, and Dr. A. J. Nicholson, Chief of the Division of Economic Entomology, and submitted by them to the executive of the Council for Scientific and Industrial Research. It is as follows:—

1. PLANT INDUSTRY AND ECONOMIC ENTOMOLOGY, JOINTLY.

(a) Existing laboratory space is inadequate for present needs, being overcrowded by both staffs and equipment. The middle block, when erected, will make possible the freeing of laboratories at present occupied by the library and clerical staff in the existing buildings, and will provide some additional laboratory space.

The two sections on the plan coloured grey were intended to be laboratories. They are fitted with benches and provided with water, gas and electric light for the purposes of chemical and entomological work. Unfortunately we have to use those parts of the buildings for the library and for clerical work so that the equipment is wasted. We have tried to overcome this handicap to some degree by putting some of the staff in temporary buildings, but these can only be regarded as temporary. The report continues:—

(b) Existing accommodation for the present clerical staff and records is most inadequate. To provide sufficient working space for the staff, we have had to house approximately half of our records away from the main office, the greater part in a small outcave about 100 yards away from the building, and the remainder in the store, also situated away from the main buildings. This arrangement is most unsatisfactory, particularly so in wet weather, and in the winter months. Again, without considering possible increases in our clerical staff, we really need more typists immediately, but we have nowhere to put them. Because of the shortage of typists, we often find it difficult to get results of experiments typed, and correspondence answered, within a reasonable time.

(c) The library, at present accommodated in several laboratory rooms, is little more than a book stack, and even so, difficulty is being experienced in finding space for new acquisitions. More space must be provided in the immediate future for more book storage, and there is no reading room, nor adequate working space for the librarian.

(d) There is, at present, no meeting room in which to hold staff discussions or lectures, nor is there any room which can be used by the staff for lunch or any emergency meal. It should be noted that owing to the isolation of the laboratories, and to inadequate transport facilities, most members of the staff have to take at least one meal per day on the premises.

(e) It will be noted that the middle block is required in order to meet our urgent needs for the present and immediate future. Even with it, there will be inadequate space for the two Canberra divisions in post-war years if their staff is to be expanded as appears necessary in order to cope with the work they will have to do. Naturally, the space provided in the plans for the library and the office staff is designed to be adequate for a period of ten to twenty years, but any space not immediately used for these purposes will certainly be required by the scientific staff until such time as additional laboratory space is provided.

That is the joint case submitted on behalf of the two divisions. The chiefs of the divisions then put their respective cases separately. These submissions are as follows:—

2. PLANT INDUSTRY.

At the present time the rooms in the botanical block, with the exception of one (the common room), are overcrowded with both staff and equipment.

In the immediate future it is estimated that with the return of officers now on overseas service, whose release we are seeking, and with the appointment of new personnel necessary for the work in progress and planned, the division will have to find room for about a dozen officers. We have one room only available in the building—a room which has been used in part latterly as a common room for meetings, and which I regard as vital for the staff. The construction of the middle block will relieve the present laboratory block to the extent of three laboratory rooms, which, with the abovementioned common room, would provide for a total of five officers.

In the middle block, there will be four rooms which could accommodate five officers for the time being. I can therefore arrange for seating room for ten officers which still leaves me to find some room for two other officers. We could manage with this somehow until we get the chemistry block, but it has to be recognized that a chemistry block is also essential, and not until it is erected will the congestion be completely relieved.

3. ECONOMIC ENTOMOLOGY.

The natural expansion of the library, records and clerical staff has progressively taken over more and more of the laboratory space in the entomology building. Our laboratories at present are badly overcrowded, and it is difficult to know how we are to accommodate members of the staff we expect to return from the services in the near future. In order to carry out the work expected of us, we must take at least a few new appointments in the very near future. Consequently, the laboratory space that will be freed in this building when the middle block is completed will barely meet our needs during the next couple of years. Additional laboratory space will be needed in the immediate post-war years.

For a long time, and particularly during the war years, our work has been greatly hampered by lack of controlled-temperature laboratory space. We would be very short-sighted if we did not take the opportunity of providing a basement in the middle block to be used for this purpose, for controlled temperatures can be maintained with particular ease in basements. If the middle block were not to be built, it would be necessary to ask for a special building for controlled temperature work to be erected immediately, and, in any case, I propose shortly to submit plans for an additional building to meet our needs for controlled-temperature rooms which admit plenty of daylight. For many of our needs, however, we do not require daylight, and rooms to meet these are shown on the tentative plans for the basement. I am at present obtaining all possible help in the design of final plans.

In the plans for the basement, rooms for the following purposes are provided:—

(a) *Study of Reactions to Physical Environment.*—Six small rooms are planned in which accurate control of both temperature and humidity will be possible (the present improvised rooms are very unsatisfactory for this purpose). With practically all insects we study, we need to know how their reactions are influenced by temperature and humidity.

There are many thousands of species of these pests in Australia, and in order to get an understanding of their life history it is necessary to cultivate them under conditions of controlled temperature and humidity. Some, like the buffalo-fly and the tick, require high temperatures. Other require low temperatures. Some need high humidity and others need low humidity.

Therefore, it is desirable to have rooms in which temperature and humidity can be controlled so that the reactions of pests can be studied.

2. *To Mr. Conelan.*—From the studies that we have made of the buffalo-fly under improvised conditions, we are convinced that it cannot come further south than Coff's Harbour. It could come down to there. It is difficult to estimate whether the pest could spread inland, where temperatures are higher but where the conditions are not so humid as on the coast. From our preliminary studies, it seems that the buffalo fly needs a combination of fairly high temperature and high humidity. I think the probabilities are that the pest will spread through the coastal areas in preference to inland districts.

3. *To the Chairman.*—The submission on behalf of the Division of Economic Entomology continues—

(b) *Maintenance of Insect Cultures.*—Four rooms are planned all of which can be heated, while one can, if necessary, be cooled somewhat below the ambient temperature. These are required for the mass-breeding of insects required in our experiments, e.g., with insecticides, and the mass-breeding of parasites.

We are constantly bringing in parasites from other parts of the world, and the difficulty is that we have to try to accustom them to the change of seasons.

The Government did not put up the whole of the buildings at Canberra; the Empire Marketing Board contributed part of the cost. One of the levers that we used to have the buildings erected was the fact that the Board had offered to contribute about £10,000 for capital expenditure.

There are two cures for St. John's wort. One suggested by Professor Ewart is to plant pine trees. The trees drop needles which cover the ground, and the canopy provided by the foliage keeps out the light. Finally the weed is killed. That is not a hopeful solution. It means the conversion of every piece of land affected by the weed to pine forests. A second method is costly. Many thousands of pounds, and probably hundreds of thousands of pounds, have been spent on it. It involves spreading two or three tons of salt to the acre. The Government of Victoria has transported salt, at a cost of 30s. or 40s. a ton, to the Bright district for many years past.

4. *To Mr. McLeod.*—That treatment does not affect roots and other things. It affects grass only temporarily. St. John's wort is very intolerant of salt.

5. *To the Chairman.*—The Council for Scientific and Industrial Research was pressed to do something about St. John's wort and it sent a man named Wilson to the south of France. He later did a lot of work during the war in keeping weevils out of wheat. His task was to try to find a parasite which would affect St. John's wort. He sent out a lot of parasites, and we liberated them about 1933-34. We were very disappointed with the results at first. Then, in 1939-40, we began to see that parasites liberated seven or eight years previously were becoming established and having a wonderful effect. In the Bright district now, the value of every piece of land formerly affected by St. John's wort has increased by £3 or £4 an acre as the result of the introduction of these parasites. That is a tribute to their value.

Dr. Tillyard discovered a parasite *Aphelinus Masi* that the Burnley Gardens authorities liberate in apple trees to kill the woolly aphid. It is a sort of lady-bird. Numbers of other successful parasites have been developed in Australia.

Probably the outstanding case in the world for all time is that of the *acaloblastis* parasite. It was introduced to Australia from Uruguay and settled the menace of the prickly pear, which covered an area of 60,000,000 acres in 1926 and was spreading at the rate

of 1,000,000 acres a year. It covered the best land in the heart of Queensland, and the outlook from an agricultural point of view was gloomy. Then this insect was introduced. It was only one of hundreds of parasites, but it was the only species which would kill the pest and commit suicide afterwards. Many other insects would attack prickly pear, but they would also attack useful crops, and therefore they could not be liberated.

The Commonwealth should have asked the Queensland Government to pay the Council for Scientific and Industrial Research a rental of 1s. an acre on the land that was liberated from prickly pear. That would have given us an income of £3,000,000 a year.

We are importing parasites from other parts of the world to attack pests in the same way as prickly pear and St. John's wort, but we cannot be successful every time. For instance, we tried to find a parasite that would handle blowfly, but we discovered that the blowfly was able to multiply so rapidly that no pest which we could produce could keep pace with it. Therefore, we cannot hope to eliminate the blowfly in that way.

In order to acclimatise parasites which we introduce from other countries to the changed seasonal conditions, we have to put them in controlled temperatures and humidities for a period of about six months.

6. *To Mr. Conelan.*—Paterson's curse is a very bad pest. It is an annual, and there is not much hope of killing an annual weed with a parasite. Suppose that we import a parasite which attacks an annual weed. It might destroy all but 1 per cent. and then die because there was no further food supply. In a few years time, the 1 per cent. of the weed not destroyed would breed up again. Of course, there is a first rate chance of destroying a perennial weed, which does not die back for six months in every year.

7. *To Mr. McLeod.*—Our difficulty is to find space for the cultivation of the many species of parasites with which we experiment. People only hear of a few of our successes. In order to discover the effectiveness of the *cactoblastis*, we had to continue investigations for years and years. An expedition was sent to South America and various parasites were tested in Queensland over a period of years before we discovered the one capable of killing the pest and which would not attack other crops.

8. *To the Chairman.*—We are doing our best to make information about our activities known to the public. Scientists are notoriously modest, but we publish the information in bulletins and in our own journal, and we also receive a great volume of publicity in the press. Of course, reading the capital city newspapers, one might imagine that the Council for Scientific and Industrial Research does nothing apart from conducting rain-making experiments and sending radio messages to the moon. However, country newspapers publish the result of our experiments in considerable detail. The city newspapers want their space for other things than results of scientific research.

9. *To Mr. Conelan.*—Prickly pear has very little value. Naturally, the most sensible use for it would have been as cattle fodder. Actually, investigations on those lines have been made both here and in America. The spines have to be singed off the prickly pear because otherwise they get into the tongues of the animals. The result is only a low-grade cattle food.

10. *To Senator O'Sullivan.*—The cost of singeing is too great to make the process worth-while. The scheme has been abandoned for that reason. Prickly pear is used as cattle fodder in South Africa, but there is plenty of cheap labour in that country. I would sooner get rid of prickly pear entirely with *cactoblastis* than attempt to use it. So long as it occupies land, that

land is unproductive. When it is eradicated, really good pastures can be grown in its place. The fact that the land where it became established grew prickly pear to a height of eight or ten feet indicates the quality of the soil there.

11. *To the Chairman.*—Another point mentioned in the submission on behalf of the Division of Economic Entomology is that four rooms are needed for seed storage and incubation experiments with seeds. That is very important. It can be readily understood that, in a place like Canberra, arrangements can always be made to carry out germination tests and so forth at temperatures above normal room temperature. However, temperatures below normal room temperature cannot be produced without means of artificial cooling. A set of rooms is needed to experiment with seeds at all temperatures between zero and 100 degrees F. There is no provision for such work at present.

The submissions conclude with the following general paragraph:—

Approval for the erection of the middle block was obtained from the Public Works Committee in 1923. Successive recommendations for its erection were not complied with, purely for reasons of economy, and never because of doubt of the needs of the two Canberra divisions. With the lapse of time, the position has become desperate, and work has, for some time, been seriously hampered owing to lack of adequate and suitable accommodation to meet present needs.

We have given much thought to the question of the essential requirements of the Divisions of Economic Entomology and Plant Industry, and in consultation with us, the Government Architect has now drawn up plans which, in our opinion, adequately meet most of our immediate needs.

We therefore, recommend an immediate approach to Treasury asking that the Works Department be given authority to anticipate approval of the estimates for the middle block so that this construction may be undertaken without loss of time.

That memorandum sets out our case. It was on that that we submitted the requisition for the building to Mr. Dadman in 1946. He gave his approval on the 20th August, 1946, on the understanding that the recommended tender would be submitted to him for approval before the contract was signed.

Our experience is that there has been a fairly substantial increase of the cost of buildings during the last twelve months. There is scarcely a building which has not cost more than we thought it would cost in 1945-46. A building that would have cost £60,000 last year is now estimated to cost £70,000. That is the proposal before the Committee.

Certain activities of the Council for Scientific and Industrial Research in the various States cannot be transferred to Canberra. We shall arrange a conference with the Australian Meat Board soon regarding research in the beef cattle industry, one of the great industries of Australia. There may be better prospects for long term improvement of that industry than any other primary industry because meat, particularly beef, will be required in increasing quantities.

We plan to send officers of the Council for Scientific and Industrial Research to all centres where problems are to be tackled. We have a group working in the Burdekin Valley. These men found, after a preliminary survey, that a dam 100 feet high across the Burdekin River 99 miles from its mouth would hold back 2,000,000 acre-feet of water, a greater quantity than could be retained by the Hume Reservoir when completed. If the dam were raised to 120 feet, it would hold 5,000,000 acre-feet of water, which would be equal to the total capacity of all Victorian water storages.

12. *To Senator O'Sullivan.*—This might also help to save the flooding of the Burdekin River each year. I could not be sure about this, because there is a technical factor governing that flooding. There is a large area of

land in the Burdekin Valley and the question to be answered is: How should the water be used if a dam is constructed? Sugar cane does not provide the answer. On present prospects, sugar cane-growing would be too risky. I consider that it would be a mistake to grow sugar cane for export purposes. Tropical fruits would not provide a satisfactory answer. The market for tropical fruits is almost saturated now.

There is one thing that we can grow and ought to grow, namely pastures for the fattening of beef cattle so that we can market in Great Britain first-class chilled beef like Argentine beef, instead of the frozen beef that we now export. However, nobody has yet proved that an irrigated pasture capable of fattening cattle can be grown in North Queensland. Until that is demonstrated, it would be decidedly risky to proceed with the construction of a dam across the Burdekin River. We have made an arrangement with the Queensland Government, through the Prime Minister and the Premier, for a thorough engineering survey of the Burdekin Valley in order to ascertain whether the results of our preliminary investigations are accurate. If they are accurate, it is clear that we can construct a gigantic water storage at low cost.

In the meantime, the Council for Scientific and Industrial Research, in conjunction with the Queensland Department of Agriculture, will conduct experiments to establish whether the 500,000 acres of land which we believe could be irrigated from such a water storage is capable of growing pastures suitable for fattening cattle. We estimate that this is a five-year job. We have already started work at Ayr, which is on the delta of the Burdekin River and where there is an established farm which was conducted by the Department of Agriculture to produce vegetables for the troops. That has been handed over by the Queensland Government, and we, in association with that government, will make a soil survey of the area to make sure that the soils are satisfactory.

We then plan to grow experimental pastures, which we will irrigate. Finally, we will bring cattle on to the pastures in order to ascertain whether they can be fattened. Our share of the investigation will cost probably £5,000 a year, but the stakes are high.

One of the difficulties experienced in Queensland is that the growing season lasts for about four months and the dry season for about eight months. It should be a remarkably productive area under irrigation during the winter months, when temperatures are high. I believe that the prospects are very good.

Another centre where the Council for Scientific and Industrial Research is working is Katherine, where we have taken over the army farm. Our survey has shown that the only area in the Darwin-Katherine region of 20,000 square miles which is worth while developing for agricultural purposes is one of 500,000 acres of red soil with limestone underneath. These soils are marginal in regard to rainfall and soil fertility, but they are cultivable and perhaps they can be made productive by the use of modern scientific methods.

Before any attempt is made to settle the area, I think that some organization like the Council for Scientific and Industrial Research should thoroughly investigate its potentialities. We should establish what kind of crops can be grown there and how the land can be used to the best advantage. The old system of trial and error was practised throughout the first 100 years of Australia's history. We should not attempt to develop the Northern Territory and other remote areas until we have the basic scientific facts before us. This would be a new and intelligent approach to the problem of developing our country.

Preliminary reports on the Barkly Tablelands are available. We have one covering the Darwin-Katherine region, which will be printed without maps.

13. *To Mr. Russell.*—In the light of present knowledge, I doubt whether it is feasible to bring about any material increase of the productivity of country adjacent to the east-west railway line. The rainfall is too light for the production of crops. There is no water for irrigation that we know about, although supplies may be discovered in future. I consider that the only prospect of improvement lies in the introduction of better types of grazing and management. I think that it would be possible to increase productivity materially by those means. However, we have not tackled country with such a light rainfall as that up to the present.

14. *To Mr. Connelan.*—The question as to whether the supply of artesian water is diminishing is of great importance. The evidence is that there has been a reduction of the rate at which individual bores flow. However, I do not think that there has been any evidence that the supply of artesian water as a whole has been depleted. The balance of evidence favours the fact that the supply is not falling off.

The Burdekin River scheme which I have mentioned is not similar to the Bradfield scheme. The Burdekin flows to the Pacific. The Darling and the Murray are the only two rivers which flow through the dry areas of Australia. It would be very difficult to distribute water from the Burdekin Valley to other States for irrigation purposes because it is on the coastal slope of the dividing range. The Bradfield scheme proposes to take water from the Burdekin River over the dividing range or through a tunnel. The proposal which we have in mind envisages a stupendous volume of water being conserved by a comparatively small dam.

The construction of this dam might also lead to the production of hydro-electric power. Those details have yet to be worked out. This is a good type of planning. The State is making an inventory of its resources, and the Council for Scientific and Industrial Research is experimenting to find out how those resources can be used to the best advantage.

15. *To the Chairman.*—The relations of the Council for Scientific and Industrial Research with the State governments are of a most cordial character. Under the Commonwealth Constitution, the six States retain sovereign powers in respect of agriculture. When the Council for Scientific and Industrial Research was established in 1927, we asked the State Departments of Agriculture to discuss whether there was a place for the Commonwealth in the field of agricultural sciences and research. Their answer was, in effect, "Most decidedly, yes". The Commonwealth, through the Council for Scientific and Industrial Research, is interested in all agricultural problems which are of common interest to two or more States. For instance, it is interested in prickly pear, which affects New South Wales and Queensland, and in buffalo fly and blowfly, which affect a number of States. Each State handles problems which affect only itself.

Co-ordination is effected through the Australian Agricultural Council. The Commonwealth is represented on the Council by the Minister for Commerce and Agriculture and representatives of Commonwealth departments. In practice, the council consists of ministerial representatives of the Commonwealth and of the States, and it is advised by the Standing Committee on Agriculture, which the Council for Scientific and Industrial Research had created in 1927. It consists of the appropriate Commonwealth and State Ministers and permanent departmental heads. The Council for Scientific and Industrial Research submits its plans to that committee, which arrives at conclusions for submission to the council.

Many divisions of the Council for Scientific and Industrial Research are established in State institutions. For example, we have the Division of Radio-Physics, the National Standards Laboratory, the Division of Physics, and the Division of Electro-Technology in the grounds of the University of Sydney. We also have the Division of Animal Nutrition in the grounds of the University of Adelaide. We are erecting a building on land which the University of Melbourne is making available to the Council for Scientific and Industrial Research. In that instance, we have an arrangement with the university, which I think will always be honoured, that the building will be available to the Commonwealth for as long as we wish to conduct research work there.

16. *To Mr. Conelan.*—An agreement to that effect has been made with the university authorities although no lease has been signed or considered necessary.

17. *To Senator O'Sullivan.*—Research into the sugar industry is an activity of the Queensland Department of Agriculture. Officers of the Council for Scientific and Industrial Research are not engaged on that work. A very interesting arrangement has been made between the Government of Queensland and the Commonwealth. The State Government has asked the Council for Scientific and Industrial Research to occupy a part of that very noble building that has been established at Saint Lucia for the University of Queensland, and early in the New Year we shall take over about 4,000 or 5,000 square feet of space in the main building as well as part of the chemical laboratory. When the bridge over the river is built and the University of Queensland wants to occupy those buildings at Saint Lucia, it will erect a laboratory building satisfactory to the Council for Scientific and Industrial Research, in the grounds of the university, but will not ask it to move its officers from the buildings at Saint Lucia until the laboratory is ready for occupation.

18. *To the Chairman.*—With regard to Empire and international problems, the Council for Scientific and Industrial Research has a number of co-operative arrangements with Empire countries. Each constituent part of the Empire finances its own activities. In 1927, twelve Imperial agricultural bureaux were established for the purpose of carrying on agricultural research. The finance for these organizations is provided by the dominions and crown colonies of the British Empire, including Ireland. They have a joint staff and they are controlled by an executive council representative of every member nation of the British Empire. The Government of the United Kingdom contributes to the expenses of these bureaux. They disseminate information regarding twelve branches of agricultural science.

For instance, there is a Bureau of Pastures, which summarizes all results of scientific work done in every country, including Soviet Russia, and distributes the information to the member governments, which pass it on to those who are interested. It is a marvellous example of Empire collaboration. The grant for these bureaux has just been renewed for a period of five years.

The Council for Scientific and Industrial Research is not now connected with the Fuel Research Laboratory at Greenwich, which deals with the production of oil from coal. At the outset of the operations of the Council for Scientific and Industrial Research, in 1926, we thought that research into the production of oil from coal was rather important, and we sent two men abroad for study. One of them is Mr. Rogers, who is now associated with the Glen Davis project as advisor and consultant. He also acts as advisor to the Department of Supply and Shipping. Then the Council for

Scientific and Industrial Research found that its resources were rather meagre and that the problems of the country were diversified, and it came to the conclusion that it should concentrate on primary production. Therefore, from 1926 until 1938, it did nothing in the field of secondary industry. It developed activities in connexion with plant industry, entomology, animal health and animal nutrition, forest products, fisheries and food preservation.

We took the view that the problems of agriculture were of overwhelming importance. Buffalo fly was causing great losses, blowfly was estimated to cost the country £4,000,000 a year, St. John's wort and other pests were rampant, and there was pressure from the primary producing sections of the community for assistance. Therefore, we devoted our limited resources to agricultural work.

Buffalo fly has been with us for a long time. I believe that it came to Australia with buffaloes from Java. For a long time it was more or less confined to the Northern Territory and in the early years of the Council for Scientific and Industrial Research, following the successes achieved with *cactoblastis* and other parasites, we thought that we might find a parasite capable of dealing with the buffalo fly. We brought a world authority in this field to Australia from the University of Geneva. He spent many years here and also visited Java, but the net result of his work was that we could not find a parasite which would seriously reduce the buffalo fly pest.

The only way in which we could control it was by spraying and dipping before the cattle were transported to the eastern States. A few years ago, during the war, the system of inspection in Queensland became a little lax and finally the buffalo fly reached the Atherton Tableland and then the east coast. There it began to develop with amazing results and it spread southwards rapidly.

At this stage, about three or four years ago, we established a little station on the Atherton Tableland. We had two ideas in mind. One was to try the effectiveness of trapping the insect, which had attacked dairy herds whereas previously it had affected only beef cattle. Little work could be done against the pest in the beef cattle industry, in which the animals are rounded up only once a year. Dairy herds are handled twice a day, and something can be done about the pest under those conditions.

At the Atherton Tableland station we tried a method of trapping based on the American horn fly trap. The horn fly is closely related to the buffalo fly. The trap was successful. As the animals went into the bails they had to pass through an opening, and as they did so brushes swept the flies from their hides. A glass and a light were fixed above them so that the flies flew to the light and were trapped. We killed them by thousands twice a day. As many as 5,000 flies were caught from one animal. This system reduced the numbers of the pests considerably but did not provide a complete solution.

At that time, DDT was being used for typhus all over the world. We decided to examine the effect of DDT on the buffalo fly and, from our tests, we are optimistic about controlling the pest now. The dairying industry need not worry much about it because, if the animals are sprayed occasionally with DDT on the shoulders, the buffalo fly is killed. The pest has a peculiar characteristic in that it cannot live longer than 24 hours without being on its host. It is not necessary to spray an animal all over. Spraying on the shoulders is sufficient. If a buffalo fly touches a little DDT, it dies. Spraying is found to be completely effective.

19. *To Senator O'Sullivan.*—The buffalo fly does not irritate the beasts to the same extent as cattle ticks. It is quite different from tick, of course. DDT is very effective for curing cattle tick, of course.

20. *To the Chairman.*—The account of our experiments in the fight against sheep blowfly is a long story. The method of attack now is prevention based on a discovery made by a practical farmer in South Australia. This man discovered that the parts affected by the sheep blowfly are the breech, and that by cutting the wrinkles out of merino sheep when the lambs are young, the urine is prevented from getting on the wool and causing decomposition, which leads blowflies to lay their eggs there. This contribution was not sufficient to enable the pest to be controlled. Other factors had to be worked out. However, we are now satisfied that the blowfly can be completely controlled by a modification of the original operation, leaving the tail about 6 inches long and cutting the breech wrinkles out in the early stages. This affords reasonable protection to the animals.

At the moment, I cannot foresee the administrative head-quarters of the Council for Scientific and Industrial Research being transferred to Canberra. A building almost as big as the Canberra undertaking is being erected at Albert-street now. The secondary industry problems to be dealt with by the Council for Scientific and Industrial Research are very important, and, in handling them, great advantage can be derived from being established close to the places where they exist.

The staff at Canberra is already housed. The chief trouble is that there is not sufficient accommodation in the Council for Scientific and Industrial Research buildings. Most members of the staff are provided with houses. Only a few recently appointed members live at hostels.

We have a very extensive system of exchange of publications with other institutions throughout the world. Practically all of our publications are sent to every university of note in the British Empire and to the major institutions in foreign countries. In return we receive whatever publications those institutions produce. The various Royal Societies and other scientific bodies particularly exchange literature with us. That saves the Council for Scientific and Industrial Research the expenditure of a great deal of money in contributions.

The provision for library accommodation at Canberra will be adequate when the proposed building is completed. Libraries extend very quickly and what might be adequate provision to-day might be inadequate in ten years time. However, fairly reasonable provision has been made in the plans for the library. It will be situated on the top floor of the building. Old records can always be removed and stored elsewhere if they accumulate in excessive quantities.

Bitter pit in apples is no longer a pest. That problem was solved by an officer now with the Department of Commerce and Agriculture.

In 1935, blue mould in tobacco was a serious pest. It was the limiting factor in the production of tobacco in Australia. It caused difficulty in raising tobacco in the seed beds. At that time, the growers and the Government were considering two proposals. One was to raise the seedlings in New Zealand and fly them to Australia, and the other was to raise them at Alice Springs and then bring them to Victoria or New South Wales. Then Dr. Angell found a method of treating the pest in the seed beds. He found that the use of benzol vapour at night completely inhibited the growth of blue mold. This meant that, if growers constructed concrete beds and used benzol vapour there while raising the seedlings, they would not suffer from blue mould.

It is sometimes said that it is very difficult to disseminate agricultural information. Farmers are said to be very conservative and slow to act. That was not so in the case of the tobacco-farmers. I inspected the tobacco-growing areas in 1937 and I found that, of the 600 growers in the north-east of Victoria, not one had failed to adopt the benzol vapour treatment, the discovery of which had been made only a couple of years previously. When a discovery of this sort touches the farmers' pockets, they very quickly assimilate the information. The control of blue mould has been very successful, and now we can enter on the production of tobacco with every confidence, knowing that we shall never experience such a debacle as we had years ago, when whole crops were wiped out.

21. *To Mr. McLeod.*—Dr. Angell carried out his research work at Canberra. His discovery created a great deal of interest.

22. *To Senator Nash.*—Provision is made in the plans for a room which can be used for lectures and staff discussions. I am afraid that similar accommodation which will be provided in the big secretariat proposed to be erected at Canberra would not satisfy our requirements. That secretariat will be a long distance from the Council for Scientific and Industrial Research buildings. Staff meetings are held at the Council for Scientific and Industrial Research probably two or three times each week. The room provided for in the plans will not be very large and it will be used not only as a lecture room, but also as a common room, where meals can be eaten and so forth. It will take up only a small part of the total area.

Apart from essential toilet facilities there is no provision in the plan for staff amenities. There will be no cafeteria in the building. The entire space in the basement will be used for the important controlled-temperature insect rooms. The floor above will be used for accounts and records, and the next floor for the Chiefs of Divisions and their technical secretaries and for the common room. The top floor will be used exclusively for the library and book stacks.

The nearest eating houses to the building will be at Civic Centre, about a mile away. The bus route will serve the proposed building. I do not think that the staff will be badly placed from that point of view. The shops at Civic Centre and some of the hostels will be reasonably accessible.

23. *To Mr. McLeod.*—Present accommodation at Canberra is about the same as it was in 1929, although the staff has increased from 59 to 356. It is a fact that some of the rooms used for office purposes contain equipment for experiments. There is no alternative. We have been obliged to increase the staff in order to cope with an increased volume of work, but we cannot provide sufficient working space.

For the initial stages of any experiment, it would be advisable to have the scientific staffs centralized at Canberra. In the field of entomology and plant industry, we could concentrate most of the scientific work at Canberra. We are doing so now as much as possible. Of course, there is no provision at Canberra for animal health work. For that purpose we have the McMaster Laboratory in Sydney and another one in Melbourne. Our headquarters for animal nutrition work is at the University of Adelaide. We are also working at the Waite Institute at Adelaide.

Any information that is brought to light by the work of the Council for Scientific and Industrial Research is passed on to farmers through the State Departments of Agriculture. We regard the States as the proper agencies for the dissemination of information. The States provide experimental stations and other facilities for us when we wish to carry out practical work.

They have been very helpful to us in that respect. We make use of State institutions to a very considerable degree in Queensland, New South Wales and South Australia. Our urgent need at the moment is accommodation adequate for the purposes of our work.

24. *To Mr. Russell.*—The Council for Scientific and Industrial Research could use probably eight more typists on its staff at Canberra if it could attract them to its service. We could also use more typists in our head office. Unfortunately, we have difficulty in competing with industry, in which girls are paid better salaries.

I could not estimate the probable increase of staff over the period of the next ten years. In my opinion, there will be a considerable increase. I should be surprised if the size of the staff is not doubled within ten years.

We had 2,488 employees in 1946-47 and this year we have 2,730. That represents an increase of 12½ per cent. per annum. Of course, that rate may not be maintained.

There is a tremendous volume of work yet to be done by the Council for Scientific and Industrial Research. We are just entering on coal research under direction from the Government. Later we shall go on to investigate the production of oil from coal and brown coal. The equipment and the staff necessary for that work will be very considerable. I can only make a wild guess at the moment at our requirements for those purposes.

I believe that the proposed building will still be large enough to satisfy our needs ten years hence. We propose to erect another building for pasture research.

I am not sure whether the weevil in wheat germinates in the grain or penetrates the grain afterwards. I believe that the insect lays its eggs in the grain and that the eggs hatch when moisture and heat conditions are satisfactory. As the insect grows it eats the flour.

25. *To the Chairman.*—I believe that the administrative quarters will be adequate for an indefinite period. We do not anticipate increased requirements in that building. However, even if the proposed building which the committee is now considering is erected, we still will not have sufficient laboratory accommodation, particularly in the field of pasture research.

I have not been closely associated with the work on water blister in pineapples. Dr. Dickson has some knowledge of that.

26. *To Senator O'Sullivan.*—Cotton-growing in Queensland does not come under the purview of the Council for Scientific and Industrial Research; that is a State matter, because cotton is grown only in Queensland. If it were grown in more than one State, the Council for Scientific and Industrial Research would certainly be interested. We are trying to grow it at Ord River and at Katherine, and we believe that it can be produced satisfactorily at both places. Whether it can be produced economically is another matter. I do not think that cotton-growing will ever become a big industry in Australia until we solve the problem of harvesting it by mechanical means.

27. *To the Chairman.*—The situation in relation to rust in wheat is very interesting. Professor Waterhouse, of the University of Sydney, is a worker of outstanding capacity in this field. He is the recognized Australian authority and is one of the world authorities on rust. We used to think that rust was a simple matter and that all rust was alike. Professor Waterhouse has shown that there are biologic strains or varieties of rust. It is just like wheat in that respect. There are varieties of wheat which are resistant to one or other of the varieties of rust, but in order to be successful we must produce a wheat that is resistant to

all varieties of rust. Professor Waterhouse has shown that there are about nine different strains of rust. In order to get a truly rust-resistant wheat, we must breed a strain that is immune to the nine strains of rust. Professor Waterhouse has shown that, by cross-breeding certain types of wheat which are resistant to three or four strains of rust with another strain of wheat that is resistant to another three or four strains of rust, and crossing the result with a third variety that is resistant to the balance of the strains of rust, it is possible to obtain, with absolutely scientific accuracy, a variety of wheat which is immune to all varieties of rust. He has actually achieved that result in north-western New South Wales.

28. *To Mr. Conelan.*—Some rusts are more damaging than others. I do not regard the rust problem in Australia as very serious, because the climate of the wheat belt is normally dry as the wheat matures.

29. *To Mr. Russell.*—The rust problem in South Australia is bad this year. When there is humid weather in October and November there is likely to be a great outbreak of rust. However, a season like the present one is unusual.

30. *To Mr. McLeod.*—The use of DDT to attack the sheep tick has not been experimented with extensively yet. We have concentrated on cattle tick.

The witness withdrew.

(Taken at Melbourne.)

MONDAY, 24th NOVEMBER, 1947.

Present:

Senator LAMP (Chairman).	
Senator Nash.	Mr. McLeod.
Mr. Conelan.	Mr. Russell.

Hampden Wendell Phillips, Director of Architecture, Department of Works and Housing, sworn and examined.

31. *To the Chairman.*—I am aware that the committee is inquiring into the proposal to erect a Divisional administrative building for the Council for Scientific and Industrial Research at Canberra. I have prepared a statement on the subject as follows:—

The proposed building will be situated between the laboratory buildings of the Division of Entomology and Plant Industry and will be used broadly for laboratory, administration and library purposes for these divisions.

This is not actually a new project, as a design for this central block was prepared by the Federal Capital Commission as a part of a scheme which included the laboratories of the two divisions. These laboratories were later erected, whilst the building of the central portion was postponed to a later date.

In January, 1945, the Council for Scientific and Industrial Research again drew attention to the urgent necessity for the erection of the building and requested the preparation of sketch plans. These have since been prepared in consultation with the officers of the council.

The following is a brief description of the proposed building and the site.

The site is in the area at Canberra set aside for the Council for Scientific and Industrial Research and comprises the space between the Entomology Laboratory and the Plant Industry Laboratory. Space in the proposed building will be used for scientific research and administrative functions associated with the Divisions of Entomology and Plant Industry. At present these activities are carried on in most unsatisfactory conditions in the two existing buildings which have become severely overcrowded. The erection of the proposed building will relieve this congestion and allow rooms designed as laboratories to be released for their specific purpose.

The relevant drawings are available for examination and consist of—A site plan, floor plans, and front elevation.

The overall dimensions of the building will be 74 ft. 4 in. by 80 ft. 7 in. There will be a lower ground floor, ground, first and second floors, having an overall floor space of 22,658 square feet subdivided as follows:—Scientific activity, 12,659

square feet equals 68 per cent.; clerical, 4,613 square feet equals 20 per cent.; services, 4,950 square feet equals 22 per cent.

32. *To Mr. Conelan.*—"Services" means lavatories, hall, corridors, and other accessories to the premises.

33. *To the Chairman.*—"The statement continues—

The lower ground floor will be used to accommodate boilers, ventilation machinery, preparation and apparatus, seed testing, incubation, plant propagation, cool rooms, constant temperature rooms and furniture storage.

The ground floor is to be occupied by the senior clerical officer, typist, accounts, records, clerical stores and the entrance hall.

On the first floor will be the chief scientific officers of the two divisions, the technical secretaries, a conference room, biometrical, assistant biometrical, photographers, computers, histology, and a common room.

The whole of the second floor will be taken up by the reference library and will comprise a reading room, librarian's office, stack room and workroom.

The proposed building has been planned in accordance with modern practice and will harmonize with the existing laboratory buildings with which it is linked up.

The structure will have reinforced concrete frame with external brick bearing walls. The stairs situated in the centre of the building will be of reinforced concrete.

The external walls will be cement rendered to match existing laboratory buildings. The main entrance and trim to windows will be of free stone.

Partition walls will be of terra cotta lumber to door head height with timber and glass above.

The entrance hall, foyer and staircase will be panelled with selected Australian timbers.

Internal Wall Finishes.—Plaster throughout except to hall, foyer and staircase where wood panelling is provided.

Floor finishes—

Entrance hall—Wood block, wax polished.

Stairs—Terrazzo of selected colours.

Constant temperature rooms and lower ground floor—Granolithic.

Offices and corridors, library, &c.—Heavy linoleum with caneite underlay.

Ceilings—

Typists rooms, conference room, common room, and computers rooms—Acoustic material.

Foyer and second floor ceilings—Fibrous plaster.

All other ceilings—Plaster.

Although these will be fully described by the Chief Mechanical Engineer, the following brief outline is given as indicative of the general services and conditions planned for.

Plant.—Boiler rooms and mechanical ventilating plant are located on lower ground floor.

Heating.—Ground, first and second floors will be heated with hot-water radiators. The heating arrangements for the scientific or research rooms on the lower ground floor are somewhat complicated and special equipment will be designed to meet the varying temperature requirements.

Ventilation.—Mechanical ventilation will be provided to the lower ground floor the air being cooled in summer and tempered in winter. Separate mechanical exhaust ventilation will be provided to the photographic dark room and common room on the first floor.

The estimated cost of the building and its services is—

	£	£
Building	50,400	
Services—		
Stormwater and sewerage ..	668	
Sewer pump in basement ..	160	
Electrical installation ..	10,000	
Roads, paths, &c. ..	100	
Mechanical installations ..	11,000	
		21,858
Total		72,258

"Granolithic" means cement rendered, with granite chips having carborundum added for extra hardness and non slip surface.

34. *To Senator Nash.*—This material should not affect the feet of members of the staff because they will not be in the constant temperature rooms very long.

35. *To The Chairman.*—I do not know how much the present building cost. There is nothing on our files to indicate why the central block was not erected, although the Federal Capital Commission considered its construction in 1920. Apparently the job was deferred and the government of the time considered that the Council for Scientific and Industrial Research could do without that block.

The roofs of the present building are flat. Flat roofs have given trouble in the past, but experience has taught us to guard against this.

It is estimated that the building will require the use of 200,000 bricks, 170 tons of cement, and 35 tons of reinforcing steel. If the bricks were eliminated from the external walls in favour of the use of coke breeze or concrete, we would save 200,000 bricks. However, I have been assured by the Director of Works at Canberra that bricks will be available for the building. The use of coke breeze or concrete would increase the amount of cement required by 80 tons also the amount of reinforcing materials by 16 tons. I have been informed that bricks are available in Canberra and that the supply is reasonably constant. Government-owned brickworks are operating there. Cement is becoming available in increasing quantities.

The man-power required for the erection of this building may have a slight effect on housing projects. However, I point out that, if works of this character are carried out in Canberra, it will be necessary to bring in builders organizations which are perhaps not available there now, and this will ultimately be reflected in increased activity in house construction.

Tiles were being manufactured in Canberra by the Government some years ago, but the plant is not available to-day. Cement tiles are now being produced by private enterprise in Canberra. Cement tiles make a satisfactory roof, but their use is not recommended for this building because the pitch required by this material would result in a prominent roof outline, aesthetically wrong in this instance.

We have given full consideration to the appearance of the front elevation of the proposed building. The design will harmonize with the treatment of the existing blocks. The appearance of the completed central block and the flanking wings will be elongated, but we are committed to that by the fact that the two wings are already in existence. The drawings of the proposed building give a satisfactory design. Members of the committee will notice from the drawings that the roof will not be flat. However the pitch will not be visible from the ground, thus the building is given the appearance of having a flat roof similar to the flanking wings.

I believe that a different treatment of the fenestration from that which is proposed would result in a lack of harmony with the two existing buildings. We have considered this point and have designed the building to be in keeping with the existing structures.

Ready-mixed concrete is being produced in the capital cities of the States. Its use has proved economical and beneficial to the building industry. However, no such companies are operating in Canberra at present. In certain circumstances, ready-mixed concrete can be obtained more cheaply than it can be mixed on the job. The reverse is the case in other circumstances. This is governed by the conditions of the job.

36. *To Mr. Conelan.*—The floor of the entrance hall could be finished with terrazzo instead of the proposed polished wood blocks. We thought that we would introduce a little variation. Certainly terrazzo stands wear very well.

37. *To Mr. Russell.*—There would be little difference between the cost of terrazzo and that of wood blocks.

38. *To Mr. Conelan.*—There will be a concrete floor beneath the caneite underlay in the corridors. Except for the brick work, the building will be of reinforced concrete. Concrete makes a good floor.

Specially prepared acoustic material will be used in the ceilings to reduce the volume of sound. There is a variety of such materials on the market. It is a matter for the Director of Works to decide which material he would specify.

You ask whether the glass required for this building would interfere with the progress of housing. Glass has been in short supply, but, as with many other commodities, the output is increasing. Allowing for the time taken to call tenders and to sign a contract, the glass would not be required for the building in less than six months.

39. *To Senator Nash.*—The recognized percentage profit allowed to a builder is 10 per cent. The profit to the contractor therefore would be that percentage of £72,000.

I do not think that men would be available to do the work by day labour. The contractor will have to secure the labour required. The department has a standing advertisement calling for building tradesmen and labourers to work in Canberra and the Northern Territory and, although there is a response to those advertisements, it is not adequate.

I was Acting Director of Works at Canberra when the Government decided to bring in 600 tradesmen from overseas, and I made the suggestion that it would be fitting for those men to undertake to remain in Canberra for twelve months after arrival, in view of the fact that they would come to Australia at government expense. I understand that the suggestion was rejected. The men could not be bound.

40. *To Mr. McLeod.*—The answer to the labour problem lies partly in the fact that each contractor has personal contact with many men. Therefore the successful contractor for this job should be able to induce men to come to Canberra, whereas they might not do so at the request of the Government. Government departments offer fair conditions, but they are able to pay only award rates, and in these days a contractor will pay higher than the award wages.

41. *To Senator Nash.*—The supervision of works such as this proposed building is the responsibility of the Director of Works and his staff.

42. *To Mr. Conelan.*—The use of hardware in the building will not interfere with the housing programme. Supplies should be ample. There might be delay in obtaining sinks and fittings of that character.

43. *To Mr. Russell.*—There has been a general increase of production of these articles. Output depends somewhat on the industrial situation.

44. *To Mr. McLeod.*—The chances of obtaining a contractor for the job are improving. The situation in this regard has eased slightly. More tenders are being accepted to-day than some months ago, although the situation is not so satisfactory as we should like it to be.

45. *To Senator Nash.*—I could not say offhand how many workmen are permanently employed in Canberra by the Department of Works and Housing. The Director of Works can supply that information.

46. *To Mr. Russell.*—It would be hard to state whether there is greater competition to-day than some years ago for big jobs. The number of big jobs coming forward is very limited, and the position is not clear yet. Twelve months ago there was virtually little competition between contractors for large works.

47. *To The Chairman.*—For the information of the Committee I shall dissect the amount of £10,000 estimated for the cost of electrical installations. The installation of light and power will cost £5,000. The provision of fluorescent lighting, with fittings, will cost £1,500. The special power requirements for the basement, where the constant-temperature rooms will be provided, will cost £1,000. The main switchboard, distribution boards and feeders will cost £1,500. Underground services to the new building and temporary supply to the existing wings during building

operations will cost £1,000. The details for this estimate are not yet fully known. In the absence of complete detail, the electrical engineers have allowed a considerable margin for contingencies. They have increased the estimate beyond the one that was originally given.

48. *To Mr. Conelan.*—The respective costs of terrazzo and wood blocks for the flooring of the entrance hall would be almost identical.

49. *To Mr. Russell.*—Terrazzo gives remarkably good service. It rarely needs to be replaced.

50. *To the Chairman.*—Only a small quantity of timber would be required for the floor. Terrazzo would certainly be more durable than wood.

51. *To Mr. Conelan.*—It is a matter of opinion as to whether terrazzo has a better appearance than wood. A good job could be done with either material.

52. *To the Chairman.*—A wooden floor polished with wax could be dangerous underfoot. Terrazzo retains its appearance over many years of wear and tear. It is easily washed. If the Committee wishes I shall have it changed to terrazzo.

53. *To Mr. Russell.*—Terrazzo is in production in the capital cities and can be supplied.

The witness withdrew.

James Fleming, Chief Mechanical Engineer, Department of Works and Housing, sworn and examined.

54. *To the Chairman.*—I am aware that the Committee is inquiring into the proposal to erect an administrative building for the Council for Scientific and Industrial Research, at Canberra. I have prepared the following brief description of the proposed mechanical engineering services for the building:—

1. Ground, First and Second Floors.—A central hot water radiator heating system will be installed to serve all occupied spaces on the ground, first, and second floors. The water will be heated in an oil-burning, cast-iron sectional boiler located in the plant room on the lower ground floor and circulated through horizontal pipe loops connected to the radiators on each floor. A small centrifugal pump will be installed to circulate the water.

The boiler will be automatic in its operation, and will only require periodical inspection and servicing. The boiler heating capacity is estimated at 550,000 British thermal units per hour and the radiators will have a total heating surface of 2,500 square feet.

As these three upper floors have good natural ventilation, it is not proposed to install mechanical ventilation, except in case of the common room on the third floor, which may be more densely occupied than other parts, and the dark room also on the third floor, which has no natural ventilation. Each of these rooms will have a small and simple form of mechanical ventilation.

2. Lower Ground Floor.—(a) *Constant Temperature Rooms.*—The lower ground floor contains twenty small rooms each of which is to be automatically held at a predetermined temperature with a fine degree of accuracy. The rooms are marked 1 to 15, excluding 9, and 3A to 8A inclusive on plan C.D.1447.

The specified temperatures for the various rooms range from a minimum of 32° Fahrenheit to a maximum of 120° Fahrenheit, and the permissible fluctuation in temperature varies from $\pm 0.5^\circ$ Fahrenheit to $\pm 2^\circ$ Fahrenheit.

To fulfil these conditions requires both heating and cooling throughout the year, and separate temperature control in each room.

An oil burning boiler, separate from that installed for the radiator heating, and much smaller than the latter, will be installed in the plant room to provide the heating, and refrigerating plant to provide the cooling.

In each room will be installed a small heating and cooling unit which will be suspended from the ceiling at an appropriate position. The unit will consist of a motor driven propeller fan and a coil for heating or cooling assembled to

form a self-contained unit. The fan circulates the room air over the coils where it is heated or cooled to the required temperature. Warm or chilled water from the plant room, as required to maintain the correct room temperature, is circulated through the unit coils, the flow of water being automatically regulated by the room thermostat. In case of the low temperature rooms, brine will be used instead of water for cooling.

The cooling plant will have a capacity of 7½ tons of refrigeration per 24 hours and the heating boiler 100,000 British thermal units per hour.

We have nothing exactly similar to that system, but we have substantially smaller installations. For instance, we have buildings with one or two controlled-temperature-rooms but we have no building with twenty such rooms. The description continues—

(b) *Ventilation*.—The preparation and apparatus room, mechanical services plant room, seed store, furniture store, and propagation room will be mechanically ventilated. These rooms are all on the lower ground floor where there will be no natural ventilation. Evaporatively cooled air in summer, and warmed air in winter will be distributed to these rooms through ductwork from a ventilating plant located in the plant room.

(c) *Air-conditioning*.—The incubation room is to be maintained at a constant temperature of 68° Fahrenheit, to within an accuracy of $\pm 2^\circ$ Fahrenheit.

A package type unit conditioner will be installed in the plant room and connected by ductwork to the incubation room.

Hot and chilled water will be supplied to the conditioner coils from the refrigerating plant and boiler mentioned in paragraph 2 (a).

3. The estimated costs are—

Central hot water heating system	£ 2,500
Equipment for the constant temperature rooms and incubation room	7,550
Ventilation in lower ground floor, common room and dark room	950
Total	£11,000

55. *To Senator Nash*.—That figure is included in the estimate of £72,000.

56. *To the Chairman*.—The cast-iron radiators will be imported. The cast-iron boilers will probably be made in Australia, although they are in short supply now. The refrigerating plant and the ventilating plant will all be made here. Unfortunately, automatic controls are obtainable only from the United States of America. I estimate that about £300 or £400 worth of this equipment will be imported.

57. *To Mr. Connelan*.—The type of boiler required for this building is very much smaller than those at the power alcohol distilleries which you mention. The department has obtained a number of big steam boilers from the Disposals Commission.

58. *To Mr. McLeod*.—All surplus material of that nature is passed over to the Disposals Commission, which circularizes lists to the Department of Works and Housing before the material is submitted to auction. The department reserves anything which it thinks it can use. It obtains a lot of equipment in that way. A lot of machinery is available just now as going concerns. It is better to dispose of equipment in that way than to pull it to pieces and use the materials. The boilers at the power alcohol distilleries would not be of any use for the building that the committee is now considering.

59. *To the Chairman*.—I would not say that imported equipment is any cheaper than Australian-made equipment. It all depends on what the equipment is. Some lines cost about the same amount, whether they be made in Australia or imported, and other lines cost considerably more when they are imported.

We can never forecast how long we shall have to wait for the supply of any materials, whether they be imported or locally produced.

60. *To Mr. McLeod*.—Conditioner coils consist of copper piping with copper fins on the outside. That equipment is locally produced. We can have them made quickly enough if the manufacturer is able to get strip copper for the fins.

61. *To Mr. Russell*.—I estimate the cost of materials that will have to be imported at £300 or £400. Cast-iron radiators and a few automatic controls for the constant temperature rooms must be imported.

62. *To the Chairman*.—None of the equipment required for the mechanical engineering services will cause interference with home-building. We do not use anything at all that is used in home-building. We use black iron piping, whereas galvanized piping only is used in home-building. Copper is used for hot-water services in homes, but the quantity of copper that we need on this job will be very small, and I do not think it will have any appreciable effect on home-building. Copper is not used in large quantities for home-building.

63. *To Mr. Connelan*.—The project for piping steam from the power house at Canberra to office buildings, which I mentioned to this Committee on another occasion, is still on the programme. We are going ahead with it. The new building for the Council for Scientific and Industrial Research could not be supplied with steam in that manner. In order to carry the steam to the building, we should have to lay an additional 3 or 4 miles of piping at least. The building will be over near Black Mountain. It would not be a payable proposition to carry the steam pipe as far as that. The distance from the power house to the site of the second administrative building is about 9,000 feet. That building is a great deal further away from the power house than the first administrative building, and it represents approximately the limit that we contemplate for piping steam from the power house. The scheme includes Parliament House, the two secretariat buildings, the new National Library, the Patents Office, the Kurrajong Hotel, and probably Barton Hostel and the new hostel. There is a large group of buildings within the range that we propose, and they will take the full output of steam from the present power house. We hope that, by the time we put this plan into operation, we will not require to generate any power from the power house. Shortages of equipment in the main New South Wales power houses should be overcome by then, and we hope that Canberra will be able to obtain sufficient power from Burrinjuck and from the seaboard power houses. It does not pay to generate power in Canberra because of the cost of hauling coal an additional 200 miles beyond the seaboard power houses.

64. *To Mr. Russell*.—The proposed building will have ordinary hot-water radiators for heating purposes. There is nothing unusual about maintaining a room temperature within $\frac{1}{2}$ degree Fahrenheit. We have done that in munitions laboratories and we anticipate no trouble in this instance.

65. *To the Chairman*.—The existing wings have a small basement each to accommodate a heating plant. The new building will have a full-length basement. The main reason for this is to provide for the constant-temperature rooms, for which an underground situation is ideal. Having them underground will make the task of controlling temperatures much easier than otherwise. There are not the same violent external temperature changes in a basement as there are in upper rooms.

The witness withdrew.

(Taken at Canberra.)

SATURDAY, 20TH NOVEMBER, 1947.

Present:

Senator LAMP (Chairman).

Senator Nash.	Mr. McLeod.
Senator O'Sullivan.	Mr. Russell.
Mr. Conelan.	

Alexander John Nicholson, D.Sc., Chief of the Division of Economic Entomology of the Council for Scientific and Industrial Research, sworn and examined.

66. To the Chairman.—I am aware that the Committee is inquiring into the proposal to erect a Council for Scientific and Industrial Research administrative building at Canberra. I have prepared the following statement:—

In August, 1926, the Parliamentary Standing Committee on Public Works recommended the erection of the laboratory building of the Division of Economic Botany (now the Division of Plant Industry) and of the central block between the laboratories of Economic Entomology and Plant Industry. Since then many efforts have been made to get the central block erected. New sets of plans have been drawn up from time to time to meet the increasing and changing needs of the two Canberra Divisions. In 1929, tenders were actually called for, but owing to financial difficulties at that time the central block was not erected then, nor was it found possible to have it built during the war years. The provision of this building, therefore, would merely meet requirements that became urgent at least fifteen years ago; it would provide only a small part of the additional laboratory space that is now urgently required owing to the considerable increase in the scientific staff of the two Divisions that has taken place during recent years because of increasing demands on their services. To meet this need additional laboratory buildings are required. Briefly, the central block of the Canberra laboratories is required for the following purposes:—

- (1) to provide adequate space for ancillary services;
- (2) to free laboratory space at present occupied by these services; and
- (3) to provide constant temperature rooms.

Ancillary Services.—In order to carry out its investigations efficiently, the research staff requires the support of many special services. It needs a specialized technical library; the assistance of a biometrical staff to analyse statistically results obtained; the services of photographers; the services of clerks and accountants to attend to the internal administration of the two divisions, including the ordering, storage and issuing of materials and equipment, and the maintenance of records (which are both complex and voluminous); and the assistance of typists in handling correspondence, reports, and the preparation of scientific papers. Up to the present these services have been accommodated in the Entomology Building, where they occupy a number of rooms designed as laboratories—a "temporary measure" adopted in 1929 when the building was first occupied. The use of valuable laboratory space for this purpose is undesirable. In addition, the space so provided is completely inadequate for these services, which are so crammed that it is difficult to maintain their efficiency. With the increase in the research staff, not only in Canberra, but also in the field stations associated with the Canberra divisions, the ancillary services must be expanded considerably. This will be impossible without the provision of additional space for them.

In the plans for the central block the space provided for the ancillary staff is little more than barely sufficient for immediate requirements, except that the library has been designed to allow for expansion at the present rate for a period of not more than fifteen years from now. In addition, there is provision for offices for the Chiefs and Technical Secretaries of the two Divisions, and for a staff common room which can also be used for staff meetings and lectures. There is also a basement, which will be discussed later.

Release of Laboratories.—After the Division of Plant Industry moved into its own building in 1932 the laboratory space available for the Division of Economic Entomology was fairly adequate for the research staff at that time. Since then, this staff has more than doubled, while the space available for it has been reduced; for in 1932 the ancillary services occupied only one large and one small laboratory, whereas now they occupy two large laboratories and one small laboratory. Thus it is seen that the recent removal of the library to a temporary building, while somewhat reducing the congestion that existed during the war years, has not given us back even the

laboratory space we had when the Division of Economic Entomology was first established. Space available to the research staff has also been reduced by the installation of much bulky equipment and by the growth of the collections that are a necessary adjunct to the work of the Division. Congestion in the laboratories has for long made the efficient prosecution of investigations very difficult indeed.

When the central block is completed, transference of staff will free two large and two small laboratories in the Entomology building. This will relieve congestion to some extent, but it will not provide adequate accommodation for even the present research staff, and more investigators must soon be added to our staff if we are to carry out all the work we are expected to do. Additional laboratories are urgently required, not only to provide adequate space for our research officers, but also to provide special facilities not available in our present building.

Constant Temperature Rooms.—The activity and growth of insects and plants is greatly influenced by temperature. Consequently, unless one can control the temperature to which the organisms under study are exposed, work on these organisms must be confined to that portion of the year during which the prevailing temperatures are favorable. With an adequate provision of controlled temperature rooms, however, the investigations can proceed at any time at the convenience of the investigators. This leads to great economy in time and effort, and to the achievement of results much earlier than would otherwise be possible. In addition, there are important lines of investigation for which the provision of conditioned space is absolutely essential.

The small number of controlled temperature rooms in the present Entomology building is quite inadequate for the work in hand, so that important investigations are often greatly delayed, or simply cannot be undertaken. In the plans of the basement of the central block provision is made for conditioned rooms that will go far towards meeting this special need. However, they should be supplemented in the near future by other conditioned rooms with daylight illumination; provision for these is made in plans already prepared for another building.

Conclusion.—In brief, the building of the central block will do little more than meet a need that became urgent at least fifteen years ago, additional buildings being required to meet our full present needs. With the central block available, however, the ancillary services, which are at present working under well nigh intolerable conditions, will be adequately housed, some laboratory space will be freed to be used for its proper purpose, and some additional facilities will be provided for the research staff. It is therefore respectfully urged that the central block of the Council for Scientific and Industrial Research Canberra laboratories be erected at the earliest possible moment.

67. To the Chairman.—The Division of Economic Entomology deals wholly with insect pests of all kinds whether they attack animals, plants, woods or any other material useful to man. In the early days our largest problem was the sheep blowfly. We are not now placing as great stress on that work as we did in the beginning, because to a large degree the problem is solved, not wholly by our efforts, but jointly with the Division of Animal Health and Nutrition, which is another section of the Council for Scientific and Industrial Research. You will know of the development of the modified Mules operation which has done a great deal to protect the sheep, the modification of tail length and also blowfly dressings which were evolved by this Division and which gave much better control. Other aspects of the blowfly were also tackled.

One of our major projects at present is cattle tick in Queensland, and the work of the last few years has indicated that the problem can be regarded as very near solution at present. The constant dipping in arsenical solutions over a number of years has led to the development of a strain of tick which cannot be killed by dipping in arsenical solutions. However, the development of ways of applying DDT, which was a difficult problem, has provided a means of handling these arsenic-resistant ticks. DDT is much more satisfactory than arsenic. It does not injure the animal as arsenic did. However, it is more expensive, although the apparent expense is greater than the actual expense because, as DDT is more efficient, the number of dippings can be greatly reduced.

The buffalo fly problem is virtually solved. The insects, which had been known in this country for more than 100 years, within the last twenty years suddenly began to spread into more important country, and in very recent years to the coastal areas of Queensland and the better cattle-raising areas. We discovered more than one method of dealing with the problem. First by a special kind of trap which was most effective in handling dairy herds but not beef cattle. However, it became obsolete when we discovered that by using small amounts of DDT on half of the animals in a herd we got complete control of the insect. The control of the buffalo fly is simpler than that of almost any other insect. A great deal has been said about the spread of the fly to New South Wales. We hold out no hope of preventing the spread, but the method developed for dealing with the pest is almost perfect.

68. *To Senator O'Sullivan.*—The fly will be very nearly eliminated. Our method of dealing with it is very simple. It only involves putting a small quantity of DDT on the backs of part of each herd. There is another point worth mentioning. If the cattle are dipped in DDT to control ticks, they need no further treatment for buffalo fly. The character of DDT is to persist in active form on the animals for so long that it will practically exterminate the fly. The fly spends most of its time sitting on the backs of the animals. They move from animal to animal until they settle on the back of an animal that has been treated with DDT. DDT persists so long that adult insects coming from eggs present at the time of dipping will be killed. In that way we can wipe out a complete generation of the fly. However, we do not expect that this will lead to complete eradication of the pest, because we cannot control migration of the fly from infested properties. But if DDT is adopted for the control of cattle tick, buffalo fly will not be a problem requiring other special measures.

Those are the major cattle problems. They illustrate the type of work being carried out in connexion with insect pests on animals. Similar investigations are proceeding in respect of many pests in a variety of other spheres. Those examples will be sufficient to indicate the work being done, and the necessity for the proposed building so far as my division of the Council for Scientific and Industrial Research is concerned.

69. *To Mr. Russell.*—It is not necessary to spray all the animals with DDT, because eventually the fly will settle on one of the animals that has been sprayed.

70. *To the Chairman.*—You asked me how much of the present building has been used for office space for my division. Only part of the work can be separated on that basis. Approximately one-quarter of the building at present is occupied by the ancillary services to which I have referred, plus my own office, and that of my technical secretary. Those rooms are fitted for use as laboratories. Most of the laboratories are used for the dual purpose of laboratories and offices.

The new building, when erected, will provide barely adequate laboratory space for our present needs. We could consider appointing additional technical staff if we had the room for them; but we could not do that at present under favorable conditions.

With respect to future expansion we have the plans for various other buildings which will meet our total requirements. This is the only building that has been submitted to the Committee.

71. *To Mr. Conelan.*—The other buildings include the new block to the left of the present building and a block behind the present building, which is designed as air-conditioned laboratories. In the basement of

the proposed centre block now under consideration constant humidity can be maintained, but artificial light will have to be used. For some work that is satisfactory, but for other work we need daylight; so, we need conditioned laboratories with daylight. We have complete plans for a new building between the main building and the insectaries. That building will be approximately 100 feet long.

72. *To the Chairman.*—You ask me how much of the new building will be required for my division. Most of the space in that building will be for common services. It is hard to say how much is for one division and how much for the other. Actually, in the basement, three-quarters of the space has been suggested for my division. In the rest of the building there is a library which is run as a common service. All the clerical staff and accountants work for the two divisions. The biometrical staff are on call to both divisions, and so are the photographers. There are a number of ancillary services of a type which both divisions require. It is felt better to have common services than to have separate services for each division. Practically the whole of the building will be occupied by common services, excepting a pair of rooms for the Chief and his technical secretary for each division.

We always keep in close contact with the States. Anything we think is of interest to them is passed on to them. Our officers maintain close relations with the various officers in the States. We get good co-operation in that respect.

73. *To Mr. Conelan.*—The State departments do not contribute to the cost of our experiments. In certain work, such as cattle tick work in Queensland, the Queensland department co-operates with us. That work is controlled by a committee on which we are represented. But we finance our work and they finance theirs.

74. *To the Chairman.*—You ask me whether our officers are well housed in Canberra, and whether accommodation can be found for additions to the staff consequent upon the erection of the new building. It is not easy to answer that question. Many of our officers are well housed. Some who arrived here recently are experiencing difficulty and many of them have not been able to obtain accommodation of the kind they feel they should have; but they are doing reasonably well.

You ask me whether, while we are making plans for the new building, we should not be making arrangements for the housing of the additional staff in consultation with the Department of the Interior. If it were possible for us to do that we should do so. However, having regard to present limitations on staff owing to our limited laboratory facilities and limitation of materials, our officers take their turn.

We have not attempted to introduce a parasite for the codlin moth. The general situation is that the codlin moth is a world-wide pest, and a major pest in the more temperate countries. For many years attempts have been made to use parasites, but without success. America has expended enormous sums of money in that direction, but without success. We are keeping in touch with their work, and the moment we see any possibility of getting a suitable parasite we shall go ahead. But for some reason it is difficult to handle the codlin moth by parasites. Entomologists who have gone into this problem carefully realize that we cannot expect to get an effective parasite against every pest. We know that it is the ideal method of control and we always want to use it. But we realize, also, as in the case of the blowfly, that the chance of

getting an effective parasite is almost nil. Therefore, we must carry out work on chemicals. We have had no glimmer of hope of getting a parasite to deal with the codlin moth. We introduced a parasite against the oriental peach moth, but it was a failure here although effective in America. Our failure was due to the fact that we could not introduce an alternative host to make the parasite work. The parasite comes out in the winter, but in this country it has nothing to attack as is the case in America, where it is thus enabled to pass through the winter. Here we cannot bridge that gap.

75. *To Mr. Conelan.*—The plan for the centre building now under consideration is totally different from the plan advanced in 1939. We are glad that the 1939 plan was not proceeded with, because it was really an austerity plan. We had been fighting for money and eventually drew up a plan based on our absolute minimum requirements. We very nearly got it; but it did not meet our requirements at that time by any means, and it would be wholly inadequate now because our needs have increased. The 1939 plan was smaller than the original plan. The present plan is adequate for our immediate needs, that is, for the next two, or three, years. When it is supplemented with the other buildings that are already planned, it will be adequate; but it needs to be supplemented with the other buildings we are planning for. Those other buildings could not be attached to the centre block. The centre block on the plan now under consideration has been enlarged considerably on the original plan and will occupy practically the whole of the space available unless we alter the character of the buildings. The only way to make it much bigger would be to carry it a considerable distance forward, because there is no room at the rear. It would not be satisfactory to enlarge the centre block in that way if we are able to proceed with the other buildings; but without those other buildings the centre block will not meet our present needs. If we can get those other buildings we can say that the centre block should be adequate for the next ten or fifteen years.

76. *To the Chairman.*—The centre block is needed to connect the two existing wings.

77. *To Mr. Conelan.*—The plan for the centre block cannot be enlarged without making a complete change which would give us an undesirable form of building. To add an extra story would put it out of balance, and we cannot go to the rear because of the hill. The only alternative would be to push it too far forward.

78. *To Mr. McLeod.*—You suggest that owing to lack of space and accommodation we cannot carry out additional investigations. I cannot say that that is exactly true, because we have another difficulty as well as lack of space. We have extreme difficulty in recruiting staff. Very few good research men are coming along. We have a number of vacant positions on our estimates at present, and if we could get suitable men we would fill them. If suitable men were available we would seek more staff. Thus we are limited in extending our investigations by the inadequate supply of recruits to our research staff. However, lack of space has been interfering with our work. We obtain our research staff through the universities.

79. *To Mr. Conelan.*—The salaries of research staffs have been greatly improved.

80. *To Mr. McLeod.*—The war left a big gap in the supply of suitable research staff. I believe that in two or three years we may get over this difficulty, but we are now feeling a big gap due to the fact that no people were being trained during the war. They are being trained now. We shall need extra staff when they are available.

81. *To Mr. Russell.*—The shortage of housing has had some effect on the recruitment of staff. We have negotiated with people to come here, and they might have come here if they had not been frightened off by the housing shortage. It is difficult to say whether that was the real reason, because the applicant simply tells you that he has decided not to accept appointment. I strongly suspect that it was due to the difficulty of getting accommodation.

It is difficult to estimate our present shortage of staff. At present with the investigations in hand and immediate investigations, I should think that we require eight, or ten, research officers plus an equal number of assistants to do the routine jobs. But if there were a reasonable chance of getting suitable men—and I would consider only appointing really suitable men—I would increase that figure considerably. It would mean that we could take up other lines which we know should be followed but which we have not even planned because of the difficulty of getting suitable staff. I should require time to estimate our staff requirements ten years hence.

82. *To the Chairman.*—You ask me what would be our requirements if we had the necessary staff and materials. We deal with problems as they arise, but, in addition, we try to maintain, as we are just managing to do to-day, a fair proportion of our staff dealing with work of a background character which is not of immediate practical importance, but upon which all the rest of the work must rest. It is fundamental work on which other work will be based. Unless we have that going on we can expect only inferior work on the practical side. There are immediate practical problems, and behind that we have a staff which we like to leave completely separate to carry out fundamental work on which we expect later practical work will be based.

83. *To Senator Nash.*—Under our original act we can deal only with problems of common interest to two or more States. There are very few problems in my division confined to one State. So far we have not met a problem in respect of which our investigations are limited because it is confined to one State. That provision does not hamper us in any way. The State entomologists look after problems confined to one State and any State which was short of staff would be content to let us handle its problems.

84. *To Mr. Russell.*—We are not investigating the fruit fly. It is not one of our present problems, but we are considering it as a project on the biological control side. Attempts to use parasites do not look very promising. Much of that kind of work has been carried out, particularly in Honolulu, and they feel there that it is an almost hopeless problem. The fruit fly has been dealt with fairly thoroughly by Queensland and New South Wales.

85. *To Senator Nash.*—You refer to a report in the Western Australian press that about 10,000 fruit trees are to be destroyed because of some disease. We have not been consulted on that problem. Apparently, it is purely a State matter.

86. *To Mr. Conelan.*—Work on bunchy top was carried out in Queensland wholly by the Queensland Department of Agriculture.

87. *To the Chairman.*—In respect of housing accommodation for our staff, we have not negotiated with the Department of the Interior to be allotted a percentage of new homes erected in Canberra. We approach the department as each new member of the staff comes along. Usually he would go on the waiting list. In unusual circumstances we make special representations and sometimes they meet us. They always do their best for us.

The witness withdrew.

(Taken at Canberra.)

MONDAY, 1ST DECEMBER, 1947.

Present:

Senator LAMP (Chairman).

Senator Nash.	Mr. Howse.
Sensor O'Sullivan.	Mr. McLeod.
Mr. Conolan.	Mr. Russell.

Bertram Thomas Dickson, B.A., Ph.D., Botanist,
Chief of the Division of Plant Industry of the
Council for Scientific and Industrial Research,
sworn and examined.

88. *To the Chairman.*—Evidence was given before the Parliamentary Standing Committee on Public Works in 1939 concerning the erection of laboratories for the Division of Plant Industry, then known as the Division of Economic Botany, and the central block between the Divisions of Economic Entomology and Plant Industry (Economic Botany) under authorization of Parliament dated 11th March, 1939. The Parliamentary Standing Committee on Public Works as of date 28th August, 1939, recommended:—

After full inquiry into the scope of the proposed laboratories and a careful consideration of the representations received from the various State Directors of Agriculture, the Committee realizes the importance of the work devolving upon the Council for Scientific and Industrial Research and the very great good to Australia that may be expected to result from the successful carrying out of the various problems of research undertaken. The Committee, therefore, is unanimously of opinion that the establishment of the proposed laboratories for the Division of Economic Botany suggested, are fully warranted, and, subject to the reservations mentioned above, recommends that the erection of the necessary buildings should be proceeded with as early as practicable.

M. D. CAMERON, Chairman.

The programmes of work envisaged then for the division comprised investigations in the following major fields:—(a) Plant diseases; (b) plant breeding; (c) investigations into the physiological requirements of crop plants; (d) agrostology; (e) soil biology; (f) plant introduction; (g) weed control, including poison plants. Subsequent to the aforesaid recommendation of the Parliamentary Standing Committee on Public Works, the erection of the laboratory block for the Division of Plant Industry (Economic Botany) was proceeded with and completed in 1932. Because of the incidence of the depression period, the erection of the central block was not proceeded with, and that block is still not erected. In the meantime, because of the imperative necessity to proceed with investigations, the staff has been greatly increased but we are now in a serious position with respect to the provision of adequate accommodation. The interim of nearly twenty years has brought about a position in which not only are we handicapped by the lack of the accommodation originally planned to be provided by the central block of the present group of buildings, but also our urgent needs have overtaken by nearly ten years those accommodation requirements, so that to-day not only do we suffer from the lack of the central block, but we need additionally at least two other laboratory blocks in order adequately to accommodate the staff. This has been brought about not only by the natural increase of the demands for investigations but especially because of the additional urgent demands for work on pastures and wool research under the Wool Research Trust Account. I venture to prophesy that we shall be asked still further to augment our research in the fields of beef, oil seeds, fibre and, perhaps, rice production. Dr. A. E. V. Richardson, Chief Executive Officer of the Council for Scientific and Industrial Research, will, I expect, have given you data about the staff now in occupancy of the present buildings as compared with the staff in the early years of our programme. I think that

it is essential to recognize that a single scientific officer may require the sole use of a laboratory, say 22 feet by 17 feet, in order effectively to house and use his equipment. The laboratories, preparation rooms, library, herbarium, &c., all mean space requirements per individual considerably in excess of those in most government departments or business houses. In other words, mere desk space is not the criterion. Our lack of space is reflected in a number of ways. First, there is acute congestion of work in many spheres. Laboratories that should house one worker must accommodate three or four. Our balance room—a room from which other activities should be excluded—has to serve also as a laboratory for two research officers. We lack many important facilities simply because there is no room to house them. We have no adequate seed testing laboratory, despite the high importance of such a laboratory to meet our work in plant industry. I should like to install a multiple temperature incubator, but cannot do so because there is nowhere to place it. We lack rooms with controlled temperature and humidity in which to study with precision the factors governing development of insect and plant life. Our whole programme of chemical and physiological studies is not only impeded but almost negated by the lack of space to be devoted to such work. The lack of space also has its effects on staff recruitment. I am at present giving consideration to leaving unfilled certain positions placed on the 1947-1948 Estimates. Though these appointments are urgently needed, I am concerned about our capacity to squeeze more workers into our present Plant Industry building. Without facilities, we cannot recruit, and without recruitment we cannot fulfil our obligations. The problem of recruitment is even more difficult in the case of senior officers. As an example, I was approached recently by a leading scientist, recognized as the foremost authority in Britain on soil pathogens. He is interested in the possibility of gaining employment with the Council for Scientific and Industrial Research in Australia and we need him for soil fertility studies. In my reply I indicated our very real interest in securing his services, but I had no alternative but to describe the lack of facilities which he would encounter in Canberra at present.

Temporary measures have been taken to secure relief from over-crowding. The over-crowding in the existing buildings has become so acute that in the absence of any permanent construction, temporary expedients have necessarily been adopted. In 1940 a set of wooden stables on the lower slopes of Black Mountain was converted to accommodate certain phases of the pasture work, particularly the handling of pasture samples from field experiments. By 1946, the accommodation position had deteriorated to such a degree that some material relief, even of temporary character, had to be adopted. Accordingly, arrangements were made for the erection on the Black Mountain site of three "Steel Fram" huts, each 60 feet by 20 feet. The use made of each of these huts is as follows:—

- (1) Accommodation of the joint library of the two divisions. This enabled some expansion of the space occupied by the clerical staff in the Entomology Division. I regard the housing of a valuable and irreplaceable library in a prefabricated hut as contrary to all safe practice. Indeed, Dr. Nicholson and I faced a protest from the research officers of the two divisions when the move was announced, but we felt that the general pressure for accommodation left no alternative in this matter.
- (2) The second hut is subdivided into two parts, one half housing the dehydrator for the drying and handling of pasture samples;

the second serving as a general agrostology laboratory, for hand separation, seeds work, weighing, &c.

- (3) The third hut has one large room and two small rooms. The large room serves as a conference room and staff room; one of the small rooms is a temporary mapping room for a draughtsman of the Division of Plant Industry and another draughtsman of the North Australia Survey Party; the second small room accommodates four technical officers.

I have given this information in some detail to illustrate the acuteness of our accommodation problem.

Our immediate requirements are (a) central block of the present group of buildings and (b) agrostology laboratory.

I have noted earlier that the erection of a central block was approved in 1929. This laboratory block, which will join the present entomology and plant industry laboratories, is planned to accommodate the services which are necessary for the conduct of research and to provide some additional laboratory space. It will provide offices for the two chiefs and for their technical secretaries. It will house the library, the photographic services and the biometrics section, and will provide special laboratories for controlled temperature and light work with both insects and plants. There is space for a committee room and for a larger staff meeting room where slides and films concerning the research work may be demonstrated. It will house our scientific records, which have become very extensive and which must be kept. Accommodation is also provided for the staff which makes the records and types reports, &c., for the records of our scientific equipment, accounts and orders. All these services are at present crammed into laboratories which are needed for research workers.

The agrostology laboratory will comprise the first unit of the second group of blocks, lying northwards from the group comprised by plant industry, entomology and the central block. The Agrostology Section in its present form was set up in 1939, and naturally became one of the most important sections of the Division of Plant Industry. With the passing of the Wool Use Promotion Act, its responsibilities have greatly increased. The study of pastures and fodder crops is an integral part of any overall research programme into wool production and substantial funds have been made available from the Wool Research Trust Account for this work. In addition, funds are available from the Wool Industry Fund to enable the erection of a laboratory at Canberra to serve the pasture workers. In determining Canberra as the most suitable point in the Commonwealth for the erection of this laboratory, the following points were considered by the Executive Committee of the Council for Scientific and Industrial Research:—

- (i) Canberra is centrally placed in the area of densest concentration of sheep in the Commonwealth. There are about 8,000,000 sheep within 100 miles of Canberra and no less than 20,000,000 within 200 miles.
- (ii) Canberra is well placed geographically to enable access to other parts of the Commonwealth.
- (iii) The Agrostology Section already had its headquarters in Canberra and must maintain contact with other sections of the Division of Plant Industry, e.g., Plant Introduction, Plant Physiology, &c.

Four principal regional centres are planned—Brisbane, Deniliquin, Adelaide and Perth—each with its dependent field stations. This set-up is closely integrated with the plans of the Divisions of Animal Health

and Production, Animal Nutrition and General Biochemistry and Soils. The realization of this overall plan for research under the Wool Use Promotion Act hinges on the provision of adequate facilities for the agrostology section at Canberra.

An urgent requirement is the physiology-chemistry laboratory. The accommodation planned twenty years ago for physiology, soil biology and general plant chemistry is now completely insufficient, and it is essential to provide the additional laboratory facilities required in a building which will in many respects be the counterpart, in the new group of laboratories, of the central block now being discussed. The work which will be done in this laboratory is basic to all the investigations being undertaken in the Division of Plant Industry.

I come now to our longer-term requirements. I use the phrase longer-term requirements not as indicating some possible need in 50 years time, but to cover the building needs within say, ten-fifteen years. The full development of our programme relating to the primary industries will necessitate the considerable expansion of the soils unit at Canberra serving a large section of eastern Australia, broadly the eastern two-thirds of Victoria and most of New South Wales other than the south-west. Similarly, officers of the Division of Animal Health and Production will be placed at Canberra when accommodation is available. It is not inappropriate also to suggest that accommodation should be provided for officers of State Departments of Agriculture who may be co-operating in research with us. We ought to have in Canberra laboratory accommodation for visiting scientists. It may be that scientists from Great Britain, the United States of America or perhaps China or India or some other country will wish to come to Australia to study our problems and we should be able to provide them with a room or rooms in which to work. They should be able to regard the Council for Scientific and Industrial Research as their home while in Australia. If such accommodation were available, I think that we could attract younger workers from other countries, such as the holders of scholarships and fellowships. Our reputation is such that scientific workers from other countries will want to come here. Some of their time will be spent in the various universities, but we should be able to provide them with accommodation and equipment in Canberra. Their research would help in the general field of international science.

A third laboratory of the second building unit will be required to serve the needs of such officers.

It is recognized that at the present time the provision of housing is an acute problem. Many of my officers are suffering from housing difficulties. At the same time it is equally urgent that we push ahead with research into the many important problems facing the primary industries of Australia at this time. It is therefore essential to provide the accommodation for research workers engaged in investigations designed to find solutions to these problems, and it is respectfully urged that the construction of the central block of the present group of laboratories, which is already twenty years late, be proceeded with as an urgent matter.

Although this inquiry relates specifically to the centre block I have thought it wise to deal with all the buildings.

I am in charge of my own division and Dr. Nicholson is in charge of his division. We are fellow chiefs. Although we do not actually have one officer working in both divisions, officers belonging to both divisions co-operate fully in many investigations. For instance, where insect pests are related to plant diseases, the officer in Dr. Nicholson's division dealing with the insects concerned and the officer in my division dealing

with plant diseases would work together as a team. They may work in each other's laboratory. They do, in fact, use the same plots in the field for experimental purposes.

89. *To Mr. Conelan.*—I am not the Government, and cannot say whether Canberra will become the main administrative centre of the Council for Scientific and Industrial Research, but I think that it ought to be the administrative centre. My personal and professional opinion is that the administrative head-quarters of the Council for Scientific and Industrial Research ought to be in the national capital where the Parliament of the nation is situated. I think that the present plans for administrative offices would be adequate for administrative head-quarters. The present scheme envisages a sister block to the one we are now discussing. It would be situated further north. Between those two blocks and facing University-avenue, and set back from the two laboratory buildings, is a big space which should be suitable for administrative offices. There are some small buildings now on the site. They are only temporary and could easily be removed. The three buildings shown in the plan constitute one block. Another similar block is proposed to be erected further north. Behind them, higher up the hill and facing University-avenue is the site of the proposed administrative offices.

90. *To the Chairman.*—We have an arrangement with the Department of Health with respect to quarantine. An important section of my division is that dealing with plant introduction. One of my officers is now in South America with an officer of the United States Department of Agriculture seeking plants. The arrangement is that when we find plants which we think would be of value to our pastoral industry, our horticultural industry or our fibre industry, we make arrangements with the Department of Health that any seeds, cuttings or setts may be brought in under a special certificate which the Department of Health approves and which I sign. The certificate is to the effect that the plant or plants will be grown under quarantine until I am satisfied that they do not contain diseases, or carry diseases or insect pests and that they are not likely to become weeds. When I am satisfied that those dangers do not exist, I arrange with the Health Department that its plant quarantine officer inspects the plant or plants. If he agrees with my views, the plants are released from quarantine, but until they are released from quarantine they are not available to any one. I think that the controls are effective. They are as near ideal as it is possible to reach. They are more effective controls than are exercised over people travelling from one country to another and carrying seeds in their pockets.

Although I am neither an engineer nor a builder, as the result of my occupation of the present buildings for fifteen years I have noticed a number of faults in the building to which I think attention should be directed. In my opinion, it is a mistake to have a flat roof because it makes drainage a difficult problem. In the summer the bitumen covering is affected by the heat, and sometimes blisters appear. When a blister breaks down water gets beneath the surface. It has penetrated the ceiling in a number of places. I could have shown you on Saturday a number of places where water had leaked through the ceiling. The windows are not waterproof, especially when a beating rain comes in from the west. The steel frame windows are not satisfactory, and not infrequently there are miniature floods in the laboratories. We have adopted all sorts of schemes to keep out the water, but without much success. The heat of the sun on the flat roof causes expansion, with the result that the parapet has been pushed out of place. Many cracks are visible,

and at times fairly large pieces of concrete have fallen to the ground. Fortunately, no one has been injured. It would appear that no provision, or at least inadequate provision, has been made for expansion.

91. *To Mr. Conelan.*—It is certainly true that the malthoid covering has deteriorated. The roof has been leaking for the last ten years. In fact, the building had not been erected very long before the roof began to leak. I understand that the roof of the new building is to have some pitch in order to shed the water, the slope being hidden behind a parapet.

92. *To the Chairman.*—A beginning was made with a survey of plant diseases throughout Australia, so that an estimate of the annual loss might be made, but the survey was never completed. When the work was begun, I was able to obtain the services of Mr. C. C. Brittlebank, who had just retired from the Victorian Department of Agriculture. His knowledge of this work was unique, and he began to prepare the records. He continued his work until the depression when, because it was necessary to effect economies, his services had to be dispensed with. The records are still in my office, but we have never had an opportunity since of continuing the work. The Agricultural Departments of Victoria, New South Wales, Queensland, and Western Australia, keep records of the occurrence of plant diseases in their own States, and an attempt is made to assess the losses due to these diseases, but the over-all Commonwealth survey has not been continued. The Standing Committee on Agriculture is still in existence. It consists of the directors or under-secretaries of the State Departments of Agriculture, together with representatives of the Commonwealth Department of Commerce and Agriculture, the Council for Scientific and Industrial Research, the Department of Health, and the Department of Post-war Reconstruction. The committee meets every six months to discuss various problems. They plan a programme of work, and the investigations are allocated to various authorities according to the nature of the work. The Council for Scientific and Industrial Research may be asked if it can undertake some particular investigation, and if we are in a position to do so we become responsible for that work. The committee had not, in recent years, considered the preparation of a Commonwealth-wide plant disease survey. I was not aware that the Department of Commerce and Agriculture proposed to set up laboratories of its own to conduct research. My own opinion is that the Council for Scientific and Industrial Research could do any work which such a laboratory would be likely to undertake. That, however, does not apply to the laboratory work to be done by the Department of Trade and Customs. Such work involves a good deal of routine testing. For instance, tests are made of the alcoholic content of spirits, and whether foods are true to label, or whether they contain deleterious materials. It is necessary to distinguish between routine examinations of that kind, which are only a matter of measuring, and research work which involves an attempt to find out something new. We in the Council for Scientific and Industrial Research are charged with the task of trying to solve problems, of trying to find out things, not previously known, in connexion with agriculture and industry. If we were to undertake routine testing of the kind mentioned, it would be necessary to have a much bigger staff and a good deal more accommodation.

93. *To Mr. Conelan.*—We have not had the site of the proposed building examined in order to see whether it would be in danger from flood water in the event of very heavy rain, but I assume that such investigations have been made by the Department of Works and Housing, or the authorities which will

be responsible for the construction work. I am reasonably satisfied that satisfactory arrangements could be made for carrying off ordinary storm-water, but what might happen in the event of a cloud-burst is difficult to forecast. The proposed building will be adequate for the immediate requirements of our staff in regard to records, typing, library, &c., but for future development it will be necessary that the sister block, which will, in the main, provide laboratory accommodation, should be completed as soon as possible. I hope that well within ten years this sister block will be erected. In fact, it should be gone on with as soon as possible. The position is ideal in that it is in close proximity to the University site. As the University is planned to be a research institution, we should be able to work in with the University authorities very well, and might be able to provide accommodation for some of the research students.

94. *To Mr. McLeod.*—By crowding three or four officers into one laboratory which was designed for one man only, we have been able to undertake some research work into wool pastures under the terms of the Wool Research Trust Account. We are very anxious to get on with this job, because of the importance of wool to Australia. I am convinced that it will remain of importance for generations to come, in spite of the competition of synthetic fibres. Of 100 officers in my division, about one-half work in Canberra, and the other half in the various centres which I mentioned in my evidence, and in the field. Because of this decentralization we are able to undertake some investigation work associated with wool—mainly investigation into pastures, and the nutritive value of various grasses. Part of the work is done in the field and part of it has to be done at the central laboratory in Canberra. We do not concern ourselves with textiles. The executive committee has decided that for investigation into textiles it is better to establish laboratories near the great centres of industry. Sydney has been chosen for one such laboratory, and for the purpose of investigating flax and other smaller fibres, a laboratory is to be established near Melbourne. I referred in my evidence to leaving certain positions unfilled. I had in mind the fact that, because of the lack of accommodation, certain investigations cannot be undertaken. We have to begin preparing our estimates in February so that they may receive Treasury approval, and be ready for inclusion in the budget later in the year. For instance, next February, I must begin preparing estimates for the year 1948-1949. I am in the position now of having to refuse to undertake certain work, but I cannot say just how many officers will not be appointed because of this fact. The provision of the new building will give temporary relief, but I shall still be in difficulties until the sister block is completed. Provision has been made in the plan for extensive library accommodation, sufficient to provide for our expanding needs for some years ahead. In the meantime, part of this library accommodation can be used for other purposes—not, of course, for laboratory work—but for ordinary office work where men who work in the field need office accommodation to complete their job.

95. *To Mr. Russell.*—We are having difficulty in getting officers because of the housing shortage, but in that we are no different from other departments. When officers are engaged to come to Canberra they have to wait eighteen months before they get houses. In the meantime, we must keep them in hotels. I think we have about ten officers living in hotels at the present time, including some in Queanbeyan. The position is the same at Deniliquin, where we have a laboratory, and I have no doubt it will be little better in Brisbane when we open our laboratory there.

96. *To Mr. McLeod.*—We do not engage in large experiments with wheat, except in one respect. We have been studying a disease called "take-all", in order to learn what are the soil conditions and the plant conditions which obtain in the incidence of the disease.

97. *To the Chairman.*—We do not actually conduct experiments for the purpose of increasing the wheat yield per acre. With respect to wheat-breeding, the arrangement which was entered into in 1926 between the Council for Scientific and Industrial Research and the State Departments of Agriculture was that we would not engage in cereal breeding, that being regarded as their function.

98. *To Mr. Conlan.*—My last statement does not apply in quite the same way to rust. The position was different. We always feel that we should not duplicate or overlap with the work of the State Departments of Agriculture or other institutions, because there are so many scientific problems to be undertaken that no people would be so silly as to duplicate each other's work. It would be a waste of scientific man-power. Wherever we can, we avoid duplication. If we know that any individual is undertaking any given problem, and is doing it well, we are perfectly satisfied. It so happens that Dr. W. L. Waterhouse, of the School of Agriculture in the University of Sydney, has spent his life, since he returned from World War I, specializing on cereal rusts. He has done a remarkable job. Not only has he studied rust, but also he has bred wheat; and people have used his results and bred wheat which is free from rust, even as far north as the Darling Downs. Because of Dr. Waterhouse's excellent work, we never touch the field of cereal rusts. We are very happy to know that he is going ahead and we would help in any way we can.

99. *To Mr. Russell.*—I am asked whether we experience any constitutional difficulties in the various States with respect to our work. That is a difficult question. All I can say is that, when the Council for Scientific and Industrial Research was started approximately twenty years ago, it was regarded with a certain degree of suspicion and jealousy by the State Departments of Agriculture. That is a cold fact. Naturally the officers in those departments would say, "We have been trying to do research work as well as extension work, and here is a new body which will have lots of money, facilities and men able to undertake all those problems which we have been wishing that we could do for years". They naturally would feel rather sorry about it all, and perhaps a bit suspicious, and would ask themselves just where this octopus would work. We had to set out in every way to prevent any increase of that feeling of suspicion, and endeavour to make it clear that it was not our object to grab everything, and take all the credit. Gradually over the years, it can now be said that that jealousy and suspicion has been allayed. For example, our very frank and sometimes hot discussions around the table of the Standing Committee on Agriculture has gradually tended to bring about better relations between the Commonwealth and the States, and to-day, we often are obliged with regret to tell our State colleagues, when they ask us to undertake certain work, that we cannot do so because of lack of staff or facilities.

Perhaps I may use an illustration from my own personal knowledge. For the last twelve years, I have been chairman of a Commonwealth-State committee where all the tobacco experts from the State Departments of Agriculture meet, and there we thrash out, not the tobacco problems of Victoria, Queensland or Western Australia, but all the tobacco problems. We ask: "How can we undertake experiments, and reach a solution of certain problems?" We have the frankest possible discussions, we record the minutes of the

meetings, and we circulate them to the various State departments concerned and they are dealt with at the Standing Committee on Agriculture. We have been doing that for twelve years.

A similar position obtains in regard to weeds. Some weeds present terrible problems in Australia, and we have been inundated with requests to undertake experiments for weed control. First of all, we had to state that we could not undertake all of them. We have not the staff. In addition, we should not undertake all of them. Some could be undertaken by the State Departments of Agriculture. We have what we call a "Weeds Co-ordination Committee" in each State. The members of these bodies include representatives not only of a Department of Agriculture but perhaps a Department of Lands, and the Council for Scientific and Industrial Research, and we meet approximately twice a year and examine the list of weeds in a State and place them in categories in order of priority. Then we ask ourselves: "Who should deal with weeds in, say, priority number one", and we might decide that that is a job for the Council for Scientific and Industrial Research? Some weeds in priority number two might be regarded as a joint job for the Council for Scientific and Industrial Research and the State department. The weeds in priority number three might then be regarded as a State job. Once we have arranged these categories, we know where we are, and we set to work. Even if a job is regarded as one for the Council for Scientific and Industrial Research, we make a point of keeping our State colleagues completely posted about all that we are doing, and obtaining their co-operation. They have all kinds of information, and they are able to supply pointers, which we would not know, because we are not in the field all the time, and they are. So we now have much better co-operation.

I could give another illustration of co-operation. There is a disease of apricots, which is known as "Brown Rot", and which is very bad in South Australia. It occurs also in Victoria and Tasmania. It has caused considerable concern to apricot-growers in South Australia, and they asked what could be done about it. The Director of Agriculture in South Australia said, "I can appoint an officer to do this work, but I think that the Council for Scientific and Industrial Research is the proper body to handle it". Therefore, with the agreement of the growers in South Australia, the Director of Agriculture in that State approached the Council for Scientific and Industrial Research and asked us to undertake the work there. The result is that we are engaged in this work jointly with South Australia and Tasmania. The work has only just begun. One of our officers is now visiting the apricot-growing area.

100. *To Senator Nash.*—I am asked whether the Council for Scientific and Industrial Research would be able to investigate a particular disease which occurred in only one State. On principle, it would not. The idea is that the Council for Scientific and Industrial Research undertakes only those problems which overlap State boundaries.

101. *To Mr. Conelan.*—If a State asks the Council for Scientific and Industrial Research to experiment with the control of a disease within its boundaries in order to prevent its spreading to other States, we could engage in the work. The State would invite the Council for Scientific and Industrial Research to undertake the job. We could do it only by invitation.

102. *To Mr. Russell.*—You point out that the altitude of Canberra is approximately 2,000 feet above sea-level, which is higher than the altitude of most wheat-growing areas in Australia, and you ask me whether the Council for Scientific and Industrial Research is experiencing any difficulty, on that account, in its research work

with rust and "take-all". First, I point out that we are not dealing with rust. Dr. Waterhouse is doing that work. The disease called "take-all" occurs in the Australian Capital Territory. It overrides all political boundaries of States, and, consequently, we can study it wherever it occurs. That is what we do.

103. *To Senator O'Sullivan.*—I am asked whether all the members of the staff of the Council for Scientific and Industrial Research are scientists, or whether there are any non-scientists. Quite a number of them are non-scientists. In our set-up, we have research officers, and joined with them are technical officers, who are not so highly trained. Then they must have a number of technical assistants, laboratory assistants, and field assistants and labourers. In order to keep records and correspondence, do the orders and check the stocks of all our valuable scientific material, we must also have a group which can be regarded mainly as clerical. You ask whether there is any administrator who would be superior to sectional administrators such as Dr. Nicholson and myself. There is such an administrator, namely, Dr. Richardson, who is the Chief Executive Officer in Melbourne, and with him, of course, is the council.

You mention that the Queensland Department of Agriculture is experimenting at Townsville with a view to discovering a suitable tropical grass. The State department consults the Council for Scientific and Industrial Research on that work. The officer who was in charge of those experiments has returned, I understand, to England. The State is endeavouring to obtain a suitable pasture for the tropics. We have sought it for years. One of the great problems of the north is the lack of protein in the pastures. We know that in southern Australia subterranean clover has meant an incalculable number of millions of pounds for the manner in which it has improved pastures and increased the nutrition of sheep. There is, as yet, nothing in the north which will do for that area what subterranean clover is doing for the south. We are seeking such a grass. Two plants are offering great promise—one is an annual and one is a perennial. One is the Townsville lucerne, and the other is a perennial *Stylosanthes*. The perennial was brought in about twelve years ago, and is also a kind of lucerne. They come from South America. The point I make is that for years, I have been hoping to be able to send an officer to South America to explore for such plants. As soon as World War II ended, I started my campaign again, but we have been able to organize it on only a small scale. We learnt that the United States Department of Agriculture proposed to send a man to South America to look for such plants, particularly peanuts, for pastures, and other food. We also have been looking for peanuts for pastures, and, in addition, there is *Stylosanthes* and a number of plants which might be of value from fifteen to twenty years hence. As soon as we knew that the United States Department of Agriculture was sending an officer to South America, we thought, "Here is our chance. We shall endeavour to join that expedition, if only we can get things moving fast enough". We were successful. In one month one of my officers was in Brazil. He is in Brazil now with Mr. Stevens, of the United States Department of Agriculture, and they will spend six months in southern Brazil, Uruguay and Argentina looking for the plants to which you referred. If we find only one, it will mean a lot to northern Australia and be well worth the expenditure.

104. *To the Chairman.*—I am asked whether anything has been done regarding pasture improvement in the southern States, except with clover. A great deal has been done in relation to various clovers, and a lot of grasses have been established. There has been a

wonderful development with respect to the use of *Phalaris tuberosa*, and before that, with perennial rye grass and Wimmera rye grass. In addition to subterranean clover, there is white clover and irrigation white clover and, last but far from least, lucerne. So a great deal has been done and is still being done to improve pastures in the south.

105. *To Mr. House.*—Earlier, I referred to the space which was necessary for the quarantining of imported plants. For some of these plants, the period of quarantine would be lengthy. Most of our introductions so far have been grasses and legumes for pasture work. These would constitute by far the great majority of importations, and after that would come cereals and annual fibre crops, and a long way after them anything which could be regarded as a long-term crop. Probably 95 per cent. or 98 per cent. of our introductions have been perennial grasses or legumes which we can watch carefully, and rapidly determine whether they are free from disease and whether they are likely to become a pest crop. So actually our space demands so far have fortunately not been excessive. If we had to deal with fruit trees, the position might become more difficult. What we should have to do in that event would be to reduce the numbers in order not to use too much space.

It is difficult to answer your questions whether suitable men have refused appointment to the Council for Scientific and Industrial Research because of the shortage of houses in Canberra. We do know that some suitable young men from the universities have applied for positions with us, but on learning of the housing situation, have withdrawn their applications and joined the staffs of State Departments of Agriculture. I do not know how many times that has happened, but I can quite understand that it may be quite a big factor. On the other hand, we are fortunate in another respect that our reputation is sufficiently good, I am happy to say, that other men are prepared to undergo that period of difficulty in order to join the Council for Scientific and Industrial Research.

106. *To Senator O'Sullivan.*—Our staff does not consist exclusively of graduates of Australian universities. We welcome any scientists of sufficient repute. You ask me whether, if a scientist is particularly qualified to assist the Council for Scientific and Industrial Research's work, we would endeavour to obtain his services. The answer is, "No, not exactly", but we keep in touch with him and when a certain investigation is proposed, in which he might be interested, he is told about it. It is suggested to him that if he is interested, he should apply. Earlier I referred to a certain Englishman. Here the position is complicated. He was a graduate of an English university. When Dr. Richardson was in England in 1926, he spotted this young man, and asked him what he proposed to do. When the young man was indefinite, Dr. Richardson suggested that he come to Australia. Finally, he did so and worked at the Waite Institute, where Dr. Richardson was then the director. He did a fine job on wheat diseases including "take-all". Indeed, his work was so excellent that he was offered a position at the Rothamsted station in England. At that time, Australia was experiencing the financial and economic depression and it was difficult for him to see where his future lay. Here, he did not have a permanent position. He went to Rothamsted, and his work has fulfilled his earlier promise. He has published a book on his field work, and a number of scientific papers. He is a delightful person. But having lived in Australia once, he desires to return here. Living in England now is not too good. He wonders whether there is an opening for him in Australia. I have had in my mind a position since I gave my evidence in 1929 and I have not been able to find a suitable person for it. This man

is now between 38 and 41 years of age and is in his prime. If we could have him for twenty years, I am sure that he would do a fine job.

107. *To the Chairman.*—I am asked how we disseminate the results of our work among the States, and into the field. This is a problem which we have always to face. First, we have a clear understanding with the State Departments of Agriculture that we shall not engage in any extension work. That is their prerogative. You suggest that we do the work, and they get the credit. We do not mind that. The point is that our job is to do research and publish the results. The first thing we do is to publish the results of our research as soon as we can. We publish them in our journal or in pamphlets or bulletins, which are sent out quite widely to anybody who indicates an interest in that particular field of investigation. That includes the officers of State departments. After that, probably the next way in which our work is disseminated is by personal discussions between our staff, and the staffs of the State departments, or with the man on the land. When we reach the man on the land in this way, it is just in casual or friendly conversation. There is no definite programme. However, we inform our State colleagues as to everything that we are doing. We invite their interest and co-operation. We tell them what our results are. If we consider that some work is so worthwhile that the result should be published as soon as possible, and we know that there is a lag of nine months in printing reports, we set to work and arrange for the reports to be mimeographed or cyclostyled. We make perhaps 200 copies and send them out to our State colleagues showing what we have done and invite them to make use of it. We suggest that if they desire to ask any questions about it, they should not hesitate to do so and we will assist them. The last one that we did was in respect of weeds and weed-killers. These results were disseminated in mimeographed form. There has been one change in this arrangement, and that is in New South Wales. Regarding the Murrumbidgee Irrigation Area, we recently reached an agreement with the State Department of Agriculture that we shall co-operate in a seven-year programme of extension work. It has borrowed three of our research officers for seven years to go into its extension field and to tell the horticulturists and rice-growers in the Murrumbidgee Irrigation Area how to handle their soils, &c. That is quite a new departure. We are, in this instance, directly concerned with work in the extension field at the request of the State.

108. *To Mr. McLeod.*—I am asked whether the results of our investigations into the elimination of weeds are available to manufacturers. They are; the manufacturers have already obtained it and are engaged in preparing materials. They are "sitting on our tails", as it were, for results. This is very spectacular. As you are doubtless aware, DDT does not destroy weeds. It destroys insects. The destroyer of weeds is methoxone, of the phenoxyacetic acid group of chemicals, and the results are phenomenal.

109. *To Mr. Conelan.*—The use of methoxone is not detrimental to the ground.

110. *To Mr. McLeod.*—We did not discover methoxone. In 1935, we used indoleacetic acid on fruit cuttings. Some cuttings are difficult to root, and we found that if the acid was diluted to a solution of one part acid and 100,000 parts water the plants would develop a callus in sand and produce roots. However, research workers in the United Kingdom and the United States of America discovered during the war that a solution of one part of a similar acid in 1,000 parts water—which was one hundred times stronger than the solution formerly used—was capable of destroying dandelions, plantains, and flat weeds. Experiments showed that when weeds of that

type were sprayed with a solution of the proportions I have mentioned, the weeds made extraordinary growth. However, in the course of this growth, they lost shape and tended to twist in upon themselves. They could not stop growing, but the final result of their distorted growth was that the tissues broke down and the plant died. As a result of such experiments commercial solutions were developed, one of which is "methoxone". To-day it is possible to destroy dandelions, "cat's ear" or clover in a lawn by simply spraying them with a solution of methoxone, and no damage is done to the grass. An extraordinary feature of methoxone is that it is most selective in its action; it does not harm grass roots at all, but in three weeks it completely destroys weeds of the type I have mentioned.

111. *To Mr. Conelan.*—We are at present engaged on experiments to eradicate "nut grass", but methoxone has not been found effective. Some chemicals, principally chloropierin, have shown encouraging results. Chloropierin was used to eradicate "nut grass" in some valuable land near Tenterfield where tobacco was being grown. The experiment was quite successful, but it would not be economical or practicable to use chloropierin for the destruction of "nut grass" on ordinary pasture land. Generally speaking, however, I am confident, because of the experiments already being conducted and the success which has attended most of them, that it will be possible in a few years time to employ particular chemicals for the destruction of particular weeds.

112. *To Mr. McLeod.*—Very successful results have been obtained in the treatment of hoary cress in the Murtos district in the Wimmera area. Those results have been obtained by spraying methoxone in wheat paddocks. By that means it has been possible to obtain 70 per cent. to 80 per cent. control of the hoary cress after twelve months, the wheat yield has been increased by 20 per cent., without any deterioration of the quality of the wheat, and without any harmful residual effect on the soil. Of course, those experiments have been going on for only eighteen months, and it is too soon as yet to make authoritative pronouncements.

113. *To The Chairman.*—We do not concern ourselves with forestry problems except by special request. However, if the Director-General of Timber and Forests requests us to make certain investigations we do so gladly and render every assistance possible. For example, he recently requested us to investigate the cause of "needle fusion" of pine trees—the needles, instead of growing apart from each other were growing together. Our investigation showed that "needle fusion" was caused by faulty nutrition, shortage of superphosphate and other chemicals in the soil where the pines were growing. However, our policy is to concentrate on problems associated with agriculture, rather than silviculture.

I believe that the botanical section of the Council for Scientific and Industrial Research will be of assistance to the botanical and scientific departments of the National University when it is established. I was formerly in charge of a botanical faculty at a university, and I know that if I had had such an organization as the present Plant Industry Division of the Council for Scientific and Industrial Research available in close proximity, I should have made considerable use of its facilities and taken my students to it for practical work.

114. *To Mr. House.*—Efforts made to eradicate grasshoppers by spraying the areas affected from aeroplanes seem to have been fairly successful. However, the eradication of pests such as grasshoppers falls within the purview of Dr. Nicholson. Of my own knowledge, I can say that it has been difficult to

achieve anything in regard to the practical control of grasshoppers. Although Dr. Nicholson and his staff have carried out some excellent research in regard to grasshoppers, their egg beds and methods of destroying them, the practical difficulties of implementing a scheme seem to have proved too great so far. At the last meeting of the Australian Agricultural Council it was suggested that a joint committee be established, comprising representatives of the Commonwealth, New South Wales, Victoria, and I believe, Queensland, to carry out a concerted scheme for the destruction of grasshoppers. The expenditure involved in the scheme suggested was to be borne by the Commonwealth and States concerned, each contributing a certain percentage. I understand that the immediate objective of the scheme was to combat the grasshopper plague in the Trangie and Gilgandra districts. However, I have heard nothing further of it, and I do not think the scheme was put into effect.

115. *To Mr. McLeod.*—Aeroplanes were used to spray certain affected areas twelve months ago, and I believe that gamexane was the chemical used.

The witness withdrew.

Kenneth Henry Oliphant, architect, Canberra, sworn and examined.

116. *To The Chairman.*—I have seen the plans of the proposed building. In many respects it is suitable, but in some other respects I think it could be improved. The plan provides for a square building of considerable size, and the internal lighting presents some difficulties. I do not know how the stairs will be lighted. Even a roof light would not be sufficient to light the lower floors. I have not seen the specifications. There are only three stairways in the whole building—one at each end and one in the middle. That number may be sufficient, but some of the rooms are a considerable distance from the central entrance. In case of fire, the distance may be too great. Another possible weakness is that the entrance to the working units is through the administrative portion of the building and may interrupt the administrative officers. The proposal is for a building of four floors, including a basement. The top floor will contain records, but the only means of getting to it is by means of stairs. There is no provision for a lift. Should there be heavy records, difficulty may be experienced in getting them up and down the stairs. It may be argued that a lift would disturb the administrative officers, but I think that that may be overcome by sound-proofing. A building of U-shape would provide better lighting and also make the installation of lifts easier. I am referring to natural lighting.

117. *To Mr. Conelan.*—I am referring now to the central portion of the proposed building. There is no natural light in the hall. The arrangement of the rooms is a matter for the administration. My only comment on the external appearance of the proposed building is that the central unit lacks strength and character to unite it to the two wings. The central entrance could, perhaps, be altered to advantage. That could be done quite easily.

118. *To The Chairman.*—The connecting links, where the lavatories are situated, need not be of the same height as the rest of the building. The appearance would be improved if they were dropped a little.

Priority in buildings is important. So far, houses of small size have had first priority. That is as it should be. After houses, I think consideration should be given to the provision of facilities for feeding the people. That involves the expansion of existing business premises and the provision of new shopping facilities. Canberra's population has increased considerably since building restrictions were first imposed. Approximately 650 houses have been occupied since 1942. Some

buildings which were previously used for offices are now again used as hotels. No additional shopping facilities have been provided to meet the needs of the larger population. For a considerable time I have been trying to get permits to provide additional shops to supply the public, but without success. As soon as permission is obtained I am ready to go ahead with a number of jobs. Buildings of that kind should be considered when priorities are being determined.

119. *To Mr. Conelan.*—This aspect of building was presented to the Minister at a deputation. He promised to review the situation in three months' time. The time has already passed.

120. *To the Chairman.*—Places in which people have to work must also be considered when fixing priorities. The time has come for a balanced building programme so that all the needs of the community shall be catered for. That raises the question of the building of clubs and recreational buildings. I place, first, the building of homes to shelter the people, next, the erection of shops to supply them with food, and, after that, places in which to work. Office space in Canberra is severely taxed, and therefore any building to accommodate workers has a claim to a priority. A balanced plan is required.

Bricks made in Canberra are unnecessarily strong for the weight they have to carry when used in home construction. The kind of brick used here adds to the cost of laying them. The reason is that they do not absorb water readily, and after a bricklayer has laid a number of courses, he has to wait for the mortar to set, otherwise the weight of the bricks squeezes the mortar out between the courses. In places where bricks are more absorbent bricklayers can carry on without interruption. The extra price charged for Canberra bricks is justified. I do not know how the makers can sell them for the price charged. I have studied this question recently and I have found it impossible to compete with the existing prices charged for bricks unless a certain type of kiln was used.

At present, roofing materials, particularly tiles, are in such short supply that a bottleneck exists. That position will eventually improve. At the moment, the position in regard to timber is fairly satisfactory, due largely to the delays caused by shortages of roofing materials. I fear, however, that there will be a shortage of suitable timber for some years. Finishing timbers are hard to obtain. There are sawmills in the district which provide hardwoods. The proposed building will not require roofing tiles and, therefore, will not interfere with the housing programme in that respect. There are plentiful supplies of cement throughout Australia, although at times supplies have been difficult to obtain. I have no large buildings in course of construction at present. I am restricted to small houses. I have in hand about 100 houses in Canberra and surrounding districts under construction. They are all small dwellings.

In my opinion, the estimate of £50,400 for the proposed building exclusive of services, is high. Indeed, the total estimated cost of £72,268, including £21,858 for services, is, in my opinion, very high. A building of this kind is different from a number of separate cottages, because the gung on the job will be all together. Moreover, the cost becomes less as the building rises in height.

121. *To Mr. Conelan.*—Contractors are hesitant about submitting firm tenders. Generally, contractors add an extra amount to cover contingencies.

122. *To the Chairman.*—The chief factor in increased building costs is the diminished labour output. Men are not any weaker than they were before the war, but they are not doing as much work. For instance, it was not unusual for a bricklayer to lay 1,000 bricks

in a day before the war; now the output is about 300 bricks a day. Before the war a man would hang twelve doors a day; to-day he will hang only four doors.

123. *To Senator Nash.*—I think that skilled tradesmen to-day are much the same as before the war. In my opinion, the trouble is that many men have lost their keenness for their work. Life to-day is more endurable but not more enjoyable. There is not the same pride in doing a good job. I make a practice of never visiting a job in the afternoon because, if I do, I am pestered by men asking me the time. I do not blame them. They could do the work if they had a greater incentive. Some men find that incentive by working at week-ends. On week-end jobs they lay more bricks than on regular working days during the week. Many men lay as many as 800 bricks a day at the week-end.

124. *To Mr. Conelan.*—It is not my policy to ask a man to work at week-ends. I believe that that is the time when he should enjoy some relaxation.

125. *To Senator Nash.*—Some builders have told me that men who work at week-ends are too tired on Monday to do their work.

126. *To the Chairman.*—I would not say that the reason is that there was a loss of skill during the depression years. Early in life I learnt that a man who is skilled in the use of tools is less tired at the end of a day's work than a man less skilled. I have in mind a young man who wanted to start in business on his own when he came out of the army. I persuaded him to continue in his old job for a time so that he could become acquainted with the changed conditions since the war began. He is now in business on his own and is doing good work. He needed some incentive.

127. *To Senator Nash.*—He employs a limited quantity of labour. He has his own team of men. They are laying many more bricks than 300 a day. They have been inspired by their employer.

128. *To Mr. Conelan.*—I do not know the percentage of trainees from Britain who are engaged in the building trade in Canberra, but I should say it is well below 80 per cent. of the total. I fear that some trainees in the industry are losing heart.

129. *To Mr. Russell.*—I do not know even approximately the number of men engaged in the building trade in Canberra.

130. *To the Chairman.*—Before the war, building costs in Canberra were higher than in Sydney, but to-day they are about the same in both places.

131. *To Mr. Conelan.*—I know Mr. Warren MacDonald, but I do not know the nature of the work upon which he is at present engaged. I believe that one of his proposals was that builders should be registered.

132. *To Mr. McLeod.*—Nowadays, concrete is always mixed on the job by machines, but it still has to be wheeled in a barrow to foundation trenches or to the hoist for carrying it to various parts of a building. Foundations are generally excavated by machinery on comparatively big jobs, because that saves money. On smaller buildings, however, it is not always practicable to use excavating machinery because it tends to damage work already done. The cost of erecting prefabricated buildings seems to be at present a little higher than the cost of erecting buildings in the normal way. That, however, may be due to the fact that this method of building is in its initial stage.

133. *To the Chairman.*—New South Wales hardwood used on local jobs does not get much chance to season. In most places it is kiln-dried. Hardwood is quite a satisfactory timber provided it is securely

fixed. It is of no use skew-nailing it, because it will pull out the nails as it dries, but if it is securely fastened it will dry in the right position. One can generally reckon on timber being a little wet to-day when it is supplied. At one time I would not use anything but oregon for roofing, but now we have to use hardwood. The pine grown in the Territory is all right for battens and flooring, but it is very soft. However, it has largely replaced imported pine, and is slightly cheaper than hardwood. Cement tiles have been used a little in Canberra, but so far only hand-made cement tiles have been available. In order to get the best results they should be made by machinery so that they can be pressed sufficiently. They are no cheaper than terra cotta tiles, but they are being used because they are the only kind available, and it is necessary to get the roofs covered. They are fixed in the same way as terra cotta tiles.

134. *To Mr. Howse.*—I agree that the present low labour output in the building industry may be in part due to a "hang-over" from the war. I remember that when I came back from the 1914-1918 war I had no wish to settle down to work until after I had had a good holiday of some months' duration. Unfortunately, at the present time, a good deal of trained labour has been diverted from the building industry. For instance, I know of some very good bricklayers who have taken on jobs serving in shops, while others have become railway porters.

135. *To Mr. Conelan.*—In some instances they give up the building trade because their wives do not like them coming home with grubby clothes. As a general thing, however, one may say that those who give it up have not their hearts in the job.

136. *To Mr. Howse.*—Building trainees receive six months' training, and at the end of that time some of them are quite good. Others, of course, are of little use, and are not worth having.

137. *To Senator O'Sullivan.*—The men tell me that they do not want to earn any more because they would then have to pay too much in taxation. I recognize, of course, that this factor is not so important now as it was during the war.

138. *To Senator Nash.*—The regular builders will not employ men on Saturdays as a rule. If they are employed on Saturdays on the new guest house near the Hotel Kurrajong they are being paid penalty rates.

139. *To Senator O'Sullivan.*—Bricklayers are paid about £8 10s. a week, and if they receive a living-away allowance their total earnings amount to about £10 a week.

140. *To Senator Nash.*—I have made a study of the average time lost by building tradesmen due to weather conditions. I should say that a bricklayer in Canberra will not get more than 40 weeks work out of the 52. At the present time, there is also some loss of time due to failure to supply material, but the men are often able to pick this up on what we call "sandwich" jobs, that is, small jobs valued at less than £100, to which we can divert men while waiting for materials to arrive on the bigger job. I am able to employ men in that way because I generally have a number of such jobs on hand, but the builder who has only one big job going, would have to stand his men down if supplies of materials were not forthcoming. I said in my evidence that, because of the hardness of Canberra bricks, which tended to make them non-absorbent, only four courses of bricks could be laid with safety; otherwise the weight of bricks would squeeze the mortar out from between the two lower courses. In an ordinary cottage wall there would be about 1,500 bricks in four courses and, with two bricklayers working, a day's work would represent 750 bricks each. At the present time, however, they are laying only about 300 bricks a day each.

A contractor who wanted to get the full 1,500 bricks laid in a day would have to put more than two bricklayers on. The supply of bricks in Canberra would be sufficient for this proposed building, and for other requirements, provided the housing programme did not greatly increase. I do not think that the stairway accommodation is quite sufficient in the proposed building to provide against fire risks. I would prefer to see an additional stairway provided. I do not know whether the plans have been submitted to any authority in Canberra with a view to seeing whether safety conditions have been complied with. Ordinarily, government buildings are not submitted for such approval. The estimated cost of this building is £72,000. A contractor ordinarily allows himself a profit margin of 10 per cent, but on a building of this kind he might even come down to 5 per cent, but more probably to 7½ per cent. I have myself accepted tenders on a cost, plus a fixed-fee basis, with a bonus if the costs were kept below a stipulated figure. Generally speaking, I do not like the cost-plus system, because it is open to abuse, but the provisions which I have just mentioned constitute some safeguard. I would not say that this building could be erected economically by day labour, but I do not see what other way there is of doing it. It will be difficult to obtain tenders for the job. In normal times, I think it is very much better to have buildings erected by contract. It is more satisfactory to make the man who is responsible for the job responsible also for keeping down the cost.

141. *To Mr. McLeod.*—It is a little more difficult, if anything, to get tenders now than twelve months ago. Contractors allow a big margin for contingencies now because of the risk of not being able to get material. One of the reasons for the slowing down of the labour on building jobs is that the general atmosphere prevailing to-day makes for that sort of thing. I agree, however, that the fact that the supply of materials is intermittent tends to make men go slow on the job, because it is of no use for them to lay all the bricks available in a few days and then be stood down for the rest of the week because no more bricks can be obtained. Our biggest problem is the supply of materials. When that is solved our labour difficulties will sort themselves out.

142. *To Mr. Conelan.*—I regard the plan of this building as quite satisfactory, with the exception of two or three points. I think that provision should have been made for a lift. Perhaps it was omitted from the plan because it was desired to avoid noise; but, generally speaking, a lift is needed in a building of more than two floors. I also believe that the lighting of the stairways could have been improved by carrying the corridor right to the back of the building. The only other way would have been to design a U-shaped building. I agree that building costs are tending to increase, but I would not say that the Government was wasting its time and money by employing Mr. Warren MacDonald. It takes some time to produce results, and I do not know in what way Mr. MacDonald is attacking the problem. From reports which I have received, the output per man in the building trade is not peculiar to the Australian Capital Territory, but is fairly general. In reply to your question, I would not say that the estimated cost of this building will be known to outside tenderers. In any event, the price will be governed in this case by the set of quantities. On a small house, that would not be so, but on a building of this size, it would apply. For a building costing more than £5,000 a set of quantities must be prepared. The quantity surveyor can always check the figures, so there would not be any need to worry about that.

All building materials which enter the Australian Capital Territory are allocated on a priority basis. Unless I give my permit number, I am not able to

obtain any materials from any supplier. Of course, the Government has priority on bricks and local timber. Some time ago, we had difficulty with the supply of bricks, but the lag has been overtaken. In addition, a good deal of the lag has been picked up with timber, except that I am not able to purchase milled timber, such as flooring, unless I plead very hard for it. This is all run for government construction, and I have to obtain supplies elsewhere as best I can.

I obtain my workmen mainly from among men who live in Canberra and Queanbeyan. Occasionally one of them is a tradesman from overseas, such as a painter. You ask me whether workmen give the same output on a government job as they do on a private job. In my opinion they do, except in one instance which I mentioned.

143. *To the Chairman.*—You suggest that there is too much similarity about the front elevation of the building and ask whether an appropriate design could be obtained, more in keeping with the conditions of Canberra. I agree that it is slightly monotonous, but the lowering of the wings and the different type of treatment of windows would help to build up the whole scheme. The fenestration of this area could be changed a little to indicate that it is the administrative section and not the actual plant industry and entomological sections. The entrance door might also be emphasized a little, but that is really a matter of opinion.

144. *To Mr. Russell.*—I do not think that you would gain anything by releasing the estimated cost of the building to the public. In a way it would probably be wiser not to release the information. We are dealing only with sketch plans and preliminary estimates. When the final drawings are done, you might make some reductions or additions. People do not often give much consideration to estimates. It will only be the public who will say that so much is being expended on the Council for Scientific and Industrial Research. The builder himself does not take much notice of that. He gets the plans and specifications and quantities and goes into these matters very carefully. Earlier in my evidence I set out my views regarding staircases for the building. I am not in a position to estimate the number of houses which are now required in Canberra. I have approximately 100 houses to build privately, but that is apart from the enormous number that the department has to build.

The witness withdrew.

David Edward Limburg, sworn and examined.

145. *To the Chairman.*—I am Assistant-Director of Works, Department of Works and Housing. I have prepared a very brief statement which begins really from the point where Mr. Phillips, our Director of Architecture, left off. The statement reads—

This building will be the connecting link between the two existing buildings comprising Divisions of Entomology and Plant Industry, and will complete this group. This group comprises one section of the original design for the whole of Council for Scientific and Industrial Research building requirements as planned by the Federal Capital Commission and illustrated in general outline only by perspective sketch herewith.

This sketch will give you a good general impression of the whole scheme. It shows the existing buildings and the new connecting link. At present, the two buildings, standing there do not give any impression of unity or balance and one is apt to feel that they are off centre. My statement continues—

It will be seen from this sketch that the ultimate central block for the Council for Scientific and Industrial Research will be sited on the axis of University-avenue with balancing groups—of which this present group is one—on either side.

The details of construction of the building, accommodation provided for and mechanical equipment have been covered in previous evidence by the Director of Architecture of this department, Mr. Phillips.

Materials.—The materials used in construction have largely been decided having regard to restriction in use of materials used for housing purposes.

The bulk of the work will comprise the following materials:—Cement, steel reinforcement, aggregate, sand, bricks, terra-cotta lumber blocks, steel windows, steel roof plates, roofing, plumbing materials including those required for air-conditioning, air-conditioning equipment, fibre board, and linoleum.

Of these materials difficulty can be anticipated with regard to the following:—Steel reinforcement, roofing, steel roof trusses, plumbing materials, air-conditioning equipment, and linoleum; but it is anticipated that these difficulties can be overcome by early placement of orders, and to some extent shortages can be overcome by substitution of sizes and in some cases of materials themselves.

The timber requirements are small and will not present any difficulties. It is probable there will be some delay in completion of air-conditioning equipment.

The use of the following materials may have some effect on the housing requirements dependent upon the actual supply position from time to time:—Steel reinforcement and plumbing materials.

Bricks.—It is not anticipated there will be any difficulty in the supply of bricks, as at present a reserve stock of approximately 800,000 bricks is held and production exceeds present demands. It is anticipated, however, that with a fully expanded programme that the full brick output will eventually be absorbed. In addition, a new concrete block machine has been obtained which will have an output equivalent to 200,000 bricks per month.

Labour.—The construction of this building will of necessity have some effect on the labour required for the construction of houses, but only to a minor degree. In the early stages it will comprise largely excavation and concrete work. It is anticipated that a building of this nature will possibly attract a building organization from outside the Australian Capital Territory which, when this building is complete, would probably be available for housing construction.

In reply to your question, "aggregate" is the metal required for concrete—crushed stone. The aggregate and sand, together with bricks, all are local products and there is no difficulty about supplies. Our head office prepared these plans. I have no idea of the cost of the two existing buildings. Brickworks in the Australian Capital Territory are supplying bricks for housing projects in Queanbeyan but are restricting the supply of bricks to outside interests entirely to housing requirements. That applies also to the Australian Capital Territory.

146. *To Mr. Conlan.*—Our brickworks are supplying bricks to the New South Wales Government for the construction of twenty houses in Queanbeyan. We are not supplying bricks for commercial buildings, but we are supplying them for the Queanbeyan Hospital. We have not arranged to supply any bricks to Cooma.

147. *To the Chairman.*—You mention that cement tiles are being manufactured in the Australian Capital Territory, and ask whether they are satisfactory. I cannot say that from our experience to date they have been very satisfactory. They are manufactured on hand machines, and the makers are experiencing great difficulty in getting the right type of labour for the work. We have had a good few cement tiles which were satisfactory but others have not been so. I understand that the Government is not considering manufacturing cement tiles. The firm which is manufacturing them by hand proposes to install mechanical plant. Although we believed that the plant might have been in operation as early as last February, it still is not yet complete, and latest advices state that it will be making tiles about the end of January. This is a big plant and will operate at the rate of three roofs a day, which is equivalent to about 750 a year. That is a big programme. The roofing position is now our worst problem. It is very largely affecting the whole programme and we are using every

possible substitute in an endeavour to meet the position. I consider that the mechanical equipment will produce a sufficient number of cement tiles for the programme.

Another item of building material now in short supply is steel, but we are managing to get by with it. It is hard to say that any materials other than bricks are hard in difficult supply, but by sustained effort and special lines of attack we manage to keep things moving.

148. *To Mr. Conelan.*—Cement has never actually held us up. There have been periods when supplies of cement have become critical, due really to strikes, but at present the position is quite healthy, at least in the Australian Capital Territory.

149. *To the Chairman.*—You ask me whether the construction of this building will hamper the housing programme, and whether the work is justified at present. The justification is hardly a matter on which I am able to comment. As Mr. Conelan says, it is a matter for the Minister. We have pressure, of course, from all sorts of quarters to undertake building programmes which we might feel are not essential, but there are other aspects which might be considered in relation to them. Whilst the emphasis is on housing and we feel that we must strive to our utmost to meet the housing position, we realize at the same time that it is necessary to have some balance of construction. Otherwise, suppose five or six years hence we did overtake the housing position, we would have a similar position in another phase of activity. If we work on a balanced programme, we shall ultimately more quickly attain to a complete result.

I am asked whether the front elevation of the building could be varied in order to make it a little less monotonous. This building has been developed over a period of years. There were earlier designs on rather different lines. I think that the two connecting links were a story lower, and the centre portion was broken up more. The front line of the building is not in one plane. The final design was decided at our head office in Melbourne. The perspective gives the best impression of the whole thing. The front flat elevation does not give a proper impression. You suggest that, when viewed from the front, the building looks a little monotonous, but when viewed from a side it does not convey that impression. A front elevation like that would not give you a factual view of it. Even if you look directly at it, you would still get the diminishing lines and light and shade which would give the impression of general massing.

150. *To Senator Nash.*—As you suggest, the proposed plan is prepared with a view to synchronizing with the rest of the building. The existing building did more or less decide the type of treatment of the central portion. In the completed scheme, we would not want the two side groups to unbalance the whole effect. The completed building scheme has a dominating central feature, and this group is one of the wings building up to it.

151. *To the Chairman.*—The main building will be the main administrative block in the centre when the whole project is completed. This project has been referred to as the administrative block but it is not the administrative block for the Council for Scientific and Industrial Research. It is only the administrative block for these two groups of buildings.

I am asked whether terrazzo is more durable than timber for the entrance hall and whether I consider that terrazzo would be more satisfactory in this instance. I believe that it would be more durable although a selected hardwood such as jarrah or tallowwood would be quite serviceable.

152. *To Mr. Conelan.*—You suggest that terrazzo would have a better appearance and would not interfere with the housing programme. There may be something in that suggestion although we do use terrazzo for sink-drainers and the like, and our local production is strained on occasions to meet the position.

153. *To the Chairman.*—I am asked what arrangements we make for the supervision of properties and the like when the building is being constructed. We would have it very closely supervised by a works supervisor. I am not sure that he would be there all the time, but he would spend a lot of his time there, and there would also be over-riding supervision by a supervising architect. The question of checking quantities would be taken up in connexion with the progress payments. All progress payments on a job of this nature, where we have a bill of quantities, are done on a check of actual quantities and materials put into the job. You suggest that it is essential on a big job of this nature to have a clerk of works on the spot all the time. It may be desirable but it depends entirely on how quickly the work progresses and just what degree of supervision is necessary from time to time. As Mr. Conelan suggests, this depends to a degree upon the honesty of the contractor, but I would say that the determining factor would be the progress of the work. Otherwise, we might have a man just standing around half the time. You state that that would be better than wasting thousands of pounds, through lack of supervision, on work like the concrete foundations for the administrative block. I am hardly competent to comment on that, but in regard to concrete or any hidden work, we would invariably have a man on the job the whole time. There would not be anything go into the job which was not seen.

You mention that Dr. Dickson stated that difficulty was being experienced with the steel windows in the Council for Scientific and Industrial Research building because they were leaking at the bottom. I am not familiar with the complaint, and, before commenting on it, I would have to see exactly what the trouble is, but steel windows certainly do not leak if they are properly installed. They can give trouble if the damp coursing around the windows is not entirely satisfactory. Steel windows are a fairly thin section and when built into a cavity wall where the cavity may be a couple of inches wide and the steel frame about an inch, the brick skins either side of the frame come fairly closely together and mortar droppings can easily cross the cavity. For that reason care is necessary to see that there is a proper dampcourse. If the window is properly installed there should not be any trouble.

We may have every difficulty in securing tenders for the job. In recent times, our experience with tenders has not been very happy. On bigger buildings of this nature, we have a better opportunity to obtain tenders than on houses. We are having extreme difficulty in obtaining competitive tenders for housing. Many of the bigger firms are looking for work of this nature rather than housing, because housing is so exacting in detail in every way. You ask me whether we find that the tenders are within the departmental estimate. To-day, estimating is most difficult. We have rising costs on every hand. In general, when times are more normal I would answer "Yes" to that question.

154. *To Mr. Conelan.*—I am asked whether I consider that the price for this building is reasonable. The price has been worked out carefully having regard to all present day conditions. We do not think that any prices to-day are reasonable. We feel that the estimate is reasonable in view of present day conditions.

155. *To Senator Nash.*—As Assistant Director of Works, I do on occasions come into close contact with the men working on the job. This depends entirely

upon the pressure of work. I have not been so closely in touch with them in recent times as I might. It is not my usual function to come into direct contact with them. It only occurs when I go out deliberately into the field to make a personal contact, or when a complaint has been made. I have some knowledge of the average type of building workers in the building industry to-day. With regard to present day output of labour the easiest trade to check is bricklaying. The average number of bricks which are laid at present ranges from between 250 to 300 per man. That output would be fairly uniform. Several factors account for the low output; one is that a large number of trainees is employed, and another is the disturbed state of mind of some bricklayers because of the controversy associated with the payment of "country allowance".

156. *To Mr. Conelan.*—Men who reside over 40 miles from Canberra are paid country allowance of 32s. 6d. a week, which coincides with the rate charged for accommodation in our workmen's hostels. Wages paid to bricklayers approximate £3 a week for a week of five days. Men who are not paid country allowance feel that those who are should do more work than they themselves do. Further, some bricklayers who have come to Canberra for employment have probably come here because they were not doing as well as other bricklayers in the cities and other places. Generally speaking, they are not as efficient as the local tradesmen. Although some controversy exists between the men concerning the payment of the allowance, the fact remains that we should not be able to obtain labour required without payment of country allowance.

157. *To Senator Nash.*—I am unable to give you any idea of the average number of bricks laid per man in 1939, but I imagine that it was much higher than the present output. Another factor making for low output is that during the war many men were transferred to trades for which they were not trained and for which they had no particular liking. That applies particularly to carpenters, but not so much to bricklayers. As an example, during the war any one who could use a hammer was employed as a carpenter. In regard to the question whether much working time is lost in Canberra because of weather conditions, there is little lost time through wet weather. The main effect which the weather has on building tradesmen here occurs in the winter time. Bricklayers, and particularly those working on high levels, feel the impact of frosty conditions rather keenly on winter mornings and their output suffers somewhat in consequence. Some time is also lost through shortage of materials, but the department has made a special effort to overcome that. Instructions are that as soon as a shortage appears likely to hold up progress, it is to be reported at once. Furthermore, we have established a Materials Procurement Section to obtain materials in short supply, and we endeavour as far as possible to line up all the materials required before a job is commenced, but unfortunately, we have never been able to achieve this because of the operation of unforeseeable factors such as strikes and other dislocations. I am asked whether, if sufficient materials were on hand, enough labour would be available to complete this work on a day labour basis. That question requires serious consideration. The present day labour organization is equipped for house construction and additional gear would be required for a building of this nature. On the basis of pre-war rates of construction one year would be required to complete the job, whereas under present conditions, two years would be required. The longer period is not occasioned solely by reduced output of labour; many other factors operate to prolong the time of completion of any large building job to-day. An average number of 40 men would be employed throughout that period. Apart from the construction of houses

we do not undertake work on a day labour basis at present. I have not had an opportunity to give any serious consideration to the availability of the necessary labour.

158. *To Mr. Russell.*—From the time a contract is accepted for this work, I should think that possibly three months would elapse before bricklayers were employed, and at the height of operations I think that about twenty bricklayers would be needed. When I referred earlier in my evidence to the difficulty of obtaining contractors for large jobs, I had in mind large-scale housing projects. Possibly the reason why local contractors do not wish to undertake works of that kind is that they are already occupied to the limit of their capacity, whilst master builders elsewhere are unwilling to come to Canberra to construct houses. Serious difficulties confront every one concerned with building to-day, including contractors, and contracts for large works involve considerable hazards. However, the construction of such a building as that at present proposed would not present quite the same difficulties as other large works because it is to be mainly a brick and concrete structure. In regard to the matter of supplies of building materials, the position so far as cement and bricks is concerned is quite satisfactory, but there has been no improvement whatever in the supply of tiles. No more tiles are available than was the case twelve months ago. Furthermore, our supplies in the Australian Capital Territory have been prejudiced by the attitude adopted by State authorities who control the distribution of tiles. They have not assisted us at all, probably because they have their own difficulties to contend with.

159. *To Senator O'Sullivan.*—Although I have been in Canberra for fifteen months, the department has not carried out any large buildings on day labour during that time. Of course, some large constructions were undertaken in Canberra in previous years on the day-labour system. Parliament House and the Hotel Acton were constructed by day labour. In reply to your question as to whether it costs more to build by adopting the system of day labour than by letting contracts, the experience of the department is that it is very difficult to "improve" on the prices quoted by contractors, although the construction of works by contract sometimes proves more costly than it would by day labour. We certainly find it more easy to get work done by day labour. Construction of houses which are being erected by day labour is far ahead of those which are being erected by contract.

160. *To the Chairman.*—You have informed me that Mr. Oliphant said that the extension of the main corridor to the rear would result in more natural light for the central staircase. My reply is that any such extension would affect the whole plan of the building. It would cut this section (indicating on plan) in two. The lighting is intended to be provided under this plan from the large skylight, down the staircase, and I believe that it would be sufficient. From the point of view of planning such a building, extension of the corridor would be a serious disability. We always strive to conserve natural light for the areas of the building in which work is to be carried out, and for that reason, staircases, lift wells, and so on, are not so important. With regard to the suggestion made to me that, in view of possible fire risk, another staircase should be provided, I am of the opinion that sufficient provision is made in the present plan to overcome that risk. Staircases are provided in the centre and at each end of the building.

161. *To Mr. Russell.*—No occupant of the building would be very far from a staircase at any time, even if he were in the centre of the building. For that reason I do not believe that the fire risk constitutes a real problem in this case.

162. *To the Chairman.*—It would be practicable to provide an outside elevator to carry stores from the stack room to the top floor to overcome the necessity for carrying stores up the stairs, but, as far as that is concerned, an internal elevator could be provided. I had not consulted the officers of the Council for Scientific and Industrial Research in regard to this matter, but the provision of an elevator, if one be desired, should not present any difficulty.

163. *To Senator Nash.*—Although the building comprises four floors, any one who wished to reach the top floor from the ground level would only have to walk up two floors. However, I agree that any one working in the "constant temperature" rooms would have to walk up three floors if he required to visit the top floor. On the other hand, I understand that very few people will require to go from the constant temperature rooms to the top floor. Although I agree that it might be desirable to consult Dr. Dickson, the Director of the Plant Division of the Council for Scientific and Industrial Research, in regard to the provision of such matters as elevators in the building, I imagine that matters of that kind were discussed fully before the plans were drawn.

164. *To Mr. McLeod.*—The provision of an elevator would not interfere with the present plan greatly; as a matter of fact, provision was made in an earlier design for the inclusion of an elevator, and I do not know the reason for its omission in the present plan.

165. *To Mr. House.*—In regard to your suggestion that the appearance of the building might be enhanced by breaking the line of the front elevation by erecting two or three columns, I think that the treatment of the front porch, which provides that the wings of the porch are to stand out some three feet on either side, terminating in a wrought iron balustrade, already achieves a similar effect. Furthermore, the trim around the windows is to be of heavily molded freestone, which will give a very strong emphasis to the front openings.

166. *To the Chairman.*—I am asked whether, in the event of no satisfactory tender being accepted for the construction of the work, that it should be entrusted to a builder on a basis of cost, plus a fixed fee, plus a bonus for savings effected. I think that we could enter into a contract on a basis of cost, plus fixed fee. We have had some experience of that type of contract, but we have never considered the idea of paying a bonus for savings effected. There is always the possibility that a contractor might seek to skimp on materials, but supervision of the construction would be in the department's hands, and that would safeguard the position. With regard to the material proposed to be employed in construction of the roof, namely, corrugated asbestos cement, there may be some difficulty in obtaining sufficient supplies. However, I believe that a satisfactory substitute could be obtained. Although you suggest that asbestos is not a satisfactory material to be used in roof construction because of its fragility, I do not agree with your contention. Although it is fragile, it has to be struck with some heavy object before it breaks. In any case, we have used it on many important buildings and have found it quite satisfactory.

The witness withdrew.

(Taken at Canberra.)

WEDNESDAY, 3RD DECEMBER, 1947.

Present:

Senator LAMP (Chairman).

Senator Nash.	Mr. McLeod.
Senator O'Sullivan.	Mr. Rankin.
Mr. Conelan.	Mr. Russell.
Mr. Howse.	

Francis Somes, executive officer of the Building Workers Industrial Union, vice-president of the Trades and Labour Council, Canberra, and vice-president of the Australian Labour party, Canberra branch, bricklayer, sworn and examined.

167. *To the Chairman.*—I am familiar with the conditions under which bricklayers work in Canberra. All bricklayers are kept fully employed in Canberra at the present time. No time is lost because of bad weather as, for the past fifteen months, or thereabouts, the men have worked under a weekly hiring arrangement. Prior to that, owing to some mistake in the clause relating to wet weather, the award was not properly carried out. The anomaly resulting from that mistake was rectified and we now start on Monday and finish on Friday. Both employers and employees have to give a week's notice of termination of services. Work is frequently held up because of shortages of materials, not of bricks, but principally of frames, especially on government day-labour projects. Those hold-ups cause a very great slowing down of the jobs. About three or four months ago, on a day-labour project at Narrabundah, from eighteen to twenty-two tradesmen were walking around waiting for work. That is one of the big drawbacks to the speedy implementation of the housing scheme. Some of the men were shifted from Narrabundah to O'Connor. On jobs carried out by private enterprise here, arrangements are usually made for the timber frames to be ahead of the work. If, for any reason, a hold-up occurs in the supplies of these frames, the contractor usually arranges with another builder to take on his men on loan until such times as the frames arrive. An instance of that is occurring now on a job being done by Simmie and Company Proprietary Limited. The men on Simmie's job are temporarily working for another builder named Chapman on a loan arrangement.

168. *To Senator Nash.*—The cause of the delay on the government day-labour job to which I have referred was due principally to inefficiency at the Acton offices. It was not due so much to shortages of materials as to the failure of the Department of Works and Housing to utilize the services of the men in the best possible way. There were 30-odd cottages in the last job. When the foundations of these had been completed and the walls taken to a height at which insertion of the frames became necessary, the men should have been shifted to other jobs, but that was not done for some time. When Mr. Lazzarini was Minister for Works and Housing, the Trades and Labour Council put up a case for the construction by day labour of nine or thirteen cottages at Narrabundah and twenty-odd cottages at Ainslie. Mr. Lazzarini sanctioned the adoption of that method of construction for those houses. That was more or less in the nature of an experiment, and the Trades and Labour Council was to be told, when the jobs were completed, whether or not that method had been successful, and if it did not prove successful where the men had fallen down on the job. The whole of the costs were to be itemized, and the Trades and Labour Council could say to the bricklayers, "It is up to you to make a job of this if you want the day-labour system adopted in Canberra." To any man not doing his job the Trades and Labour Council could say, "This is up to you. If you do not make a job of it, you will be the one to lose the good conditions associated with day-labour work." Mr. Lazzarini, however, lost the portfolio of Minister for Works and Housing and, under the new Government, Mr. Lemmon assumed that office. I have had three or four conferences with the Works Director, Mr. Potts, and Mr. Phillips, who was Acting Works Director before him, in which I submitted to them my ideas for reducing building costs;

but they did not seem to agree with them. Now, however, twelve months afterwards, suggestions which I then made are being incorporated in the jobs.

169. *To the Chairman.*—I would not go so far as to say that the inefficiency at the Acton offices is due to lack of staff. The cottages erected by Mr. Toy at O'Connor were scheduled to be constructed by day labour, but the department was unable to provide an efficient foreman to look after them and the contract was let to Toy. The Government prime costed the items and sold the frames to Toy. The sizes of the frames are pretty well standardized. As we were stuck for frames at Narrabundah, Mr. Limberg went to Sydney and bought steel frames.

When the Englishmen came here last January, the department was not ready to employ them fully and we had as many as 22 bricklayers working on one cottage job. That was most uneconomic. A gang of five men is ample for efficient brickwork on a cottage. If the gang consists of more than five men, the men get in each other's way. Imagine 22 men working on a cottage the floor area of which is not very much greater than the room in which we are now sitting! The employment of a greater number of men on the job makes for inefficiency all round. The Englishmen had to become acclimatized. When they arrived it was hot and the heat affected them. The cost of a couple of cottages on which they were employed was terrific.

170. *To Mr. Conelan.*—They were classed as tradesmen. They came out here with union qualifications from England. They belonged to the unions there. The Building Workers Industrial Union spoke to Mr. Calwell about the matter. Mr. Calwell arranged for a conference to be held at the old hospital building, but instead of him or Mr. Dedman being present, the union officials met only representatives of the Ministers. We tried to arrive at a suitable basis upon which the trainees under the Commonwealth reconstruction training scheme could be trained here. We said, 'Why bring the Englishmen out here; why not use our own ex-servicemen?' Mr. Limberg, who was acting for the Department of Works and Housing, said that the department would dictate who should come here, and not the union. We agreed that the department had the right to do so, but we contended that if the day-labour system were to be adopted on a proper basis the union should have some say in its operation.

The number of bricks laid by bricklayers employed on day-labour jobs at Narrabundah has varied. In the early stages of construction we were laying over 400 bricks a day. The trainees under the Commonwealth reconstruction training scheme began work in January or February. I was employed there in April. In the following January the Englishmen came here. We went through a bad winter and the average dropped to approximately 350 bricks a day. When the Englishmen came our figures went flat. After that they started to rise again. When the change-over came there were about five of us left there and we were laying about 500 or 600 bricks a day. The bricks then were approximately £4 a thousand.

171. *To Mr. House.*—That was about three or four months ago, or perhaps a little longer. That could be easily checked by investigating the figures relating to the Narrabundah day-labour project. I was then working as a shop steward. When Mr. Oliphant gave his evidence he did not appear to know that the average figures relating to the laying of bricks applied to the work of all concerned, including skilled bricklayers, the English tradesmen, the apprentices and the trainees under the Commonwealth reconstruction training scheme. The average figure did not represent the average output of a skilled worker.

172. *To Mr. Conelan.*—Before the war I worked for two piece-workers in Canberra. We had a very good hod-carrier. One wet day, while sheltering from the rain, we had a debate about how many bricks we were laying. We examined the brick tickets for eleven months and arrived at an average of 600 bricks a day for each man. There were three bricklayers employed on the job.

173. *To Senator Nash.*—They were all competent bricklayers, and this was at a time when bricklayers were walking around looking for jobs.

174. *To Mr. Conelan.*—On the job on which I was working at Narrabundah there were five men employed and we were laying about 500 bricks a day. That would work out at something like £4 a thousand. We were a small gang and doing a small job. If you were working on the construction of, say, twenty or 30 cottages, you could spread the men economically, provided you could obtain satisfactory labourers. The shortage of suitable labourers is the crux of the building position to-day. To-day, there is no piece-work but work is let out to sub-contractors. Persons may register here as sub-contractors. I have read the report of Mr. Oliphant's evidence and I am amazed at its inaccuracy. Mr. McPhail, who is perhaps the fastest bricklayer in Canberra, cannot lay bricks at the rate of 1,000 a day, and he is an exceptionally good tradesman. That man, unfortunately, is being wasted. He is carrying a hod because he cannot get a hod-carrier. Other good men are also carrying a hod for the same reason. Thus, competent bricklayers are wasting their time doing labourers' work.

175. *To Mr. Russell.*—The result of the shortage of builders' labourers is that good bricklayers are not fully availed of. A good worker establishes a very desirable environment for those who work with him. The pace-maker establishes the pace, even though he may not deliberately do so. If a man is working on a job which is constantly held up for one reason or other, he is given no incentive to do his best. It is not unnatural for him to think that if he goes along at a reasonable pace, he will be out of bricks or his labourer will not be able to keep up with him. In that way the speed of a job steadily declines. The trainees under the Commonwealth reconstruction training scheme say that they will lay only 300 bricks a day. I do not know where they got that idea from. Some people say that it is the union which fixes the rate at which bricks are laid. In all my experience of the union, I have never yet heard any union official say what the rate should be. Here, in Canberra, members of the Trades and Labour Council are working flat out to make the day-labour system pay. That activity is noticeable right throughout the country. However, some people seem to be intent on crushing that system. When a bricklayer is working for a builder and supplies are held up, he goes straight to the builder and tells him what is happening. Under the day-labour system, however, the position is entirely different. If construction was held up for some reason or other, there was a time when I could see Mr. Lemmon or Mr. Potts and arrange for a flow of materials for a while; but there were always interruptions.

Materials are coming forward a little more expeditiously now. Chapman has most of the frames he requires. He has a contract for a block of flats. The department has its own jobs at Narrabundah and has day-labour jobs at O'Connor. It is true that quite a number of bricklayers undertake jobs during the week-end. At week-ends, they work on a piece-work basis and, as generally applies to such jobs, the faster the work the better the pay. Furthermore, they work without supervision. In Canberra, bricklayers have to do a good job. I admit that some of the new cottages

being erected are fairly rough, but on the whole the brickwork in Canberra is as good as is to be found anywhere in the Commonwealth. In the past, the clerk of works used to stand over a bricklayer and watch him at work. All joints had to be full. Nowadays there are a lot of breaks. We have made representation to the department for the abolition of nibs in internal brickwork. In the bathroom of one of the cottages we are building now a nib is put running right up the wall. That is unnecessary. It was used solely for the purpose of hanging a door. Our union argued until the department agreed to replace the nib by a piece of timber upon which the door is hung. A bricklayer could lay three or four bricks while cutting one nib. Too many breaks in the wall slow down the job.

178. *To Mr. Conelan.*—Houses constructed under the Commonwealth-State housing scheme have too many breaks in the brickwork. All frame sizes work to brick sizes. An architect desires to have a window placed in the middle of a room, but for economical working you have to work that window to suit the brickwork; otherwise too many bricks have to be cut.

177. *To the Chairman.*—Where I am working now four trainees under the Commonwealth reconstruction training scheme are employed for each tradesman. The department is not putting its weight in regard to these trainees. Last week an officer from the Department of Post-war Reconstruction asked if Primmer could place another man. Primmer said, "I am already over-loaded". I said, "What about asking the Department of Works and Housing to take him on?" The officer said "We have been to the department but the department has indicated that it can not get labourers". In the early days, private enterprise was always asking for labourers, but could not get them because they were absorbed by the department. As regards trainees under the Commonwealth reconstruction training scheme, we are saturated in Canberra. Unless it is possible to obtain a sufficient number of labourers and hod-carriers here, the Commonwealth reconstruction training scheme is of no value. It is not economic to employ more than five bricklayers on the construction of a single cottage. The wages now paid to bricklayers amount to £3 17s. 6d. a week. In addition some men are paid a living-away-from-home allowance. The payment of that allowance to some, and its withholding from others, has a bad effect on the industry. These living at the Eastlake or River-side hostels get their board for 82s. 6d. a week.

178. *To Mr. Conelan.*—The Englishmen do not get the allowance, but they pay only 32s. 6d. a week for board. The trainees under the Commonwealth reconstruction training scheme receive an amount approximating the basic wage. A single man receives initially £3 8s. a week. After six months' training he receives the full award wage, 60 per cent. of which is paid by the Commonwealth and 40 per cent. by his employer. After a certain period his efficiency is assessed and he is paid accordingly.

179. *To Mr. Howse.*—An officer comes down from Sydney to assess the percentage of efficiency of the trainees. I do not believe that that officer is doing a good job. The last time he came down he assessed from 20 to 26 men in a half a day. It was impossible for him to do his job properly in that time. It is true that he was here for three days, but a strike was in progress and he could not interview the men.

180. *To Mr. Conelan.*—The Building Workers Industrial Union had passed a resolution that no week-end work be done by its members except for a member of the union who is engaged in building his own home. In such cases members of the union may work for nothing or for whatever wages may be determined between the parties.

181. *To the Chairman.*—One of the most important means by which the relations between the workers and the department may be improved is by following the example set by private enterprise and establishing workers' committees to make suggestions for the improvement of the industry. The steelworkers have adopted such a system.

182. *To Mr. McLeod.*—I have suggested to the department that such a system be adopted.

183. *To Mr. Russell.*—That suggestion was made when Mr. Lazzarini and Mr. Johnstone inspected the job on which I was employed. I did not approach Mr. Lemon on the matter, but I did recommend to him that we install "suggestion boxes" on the jobs, and that suggestions made by the men be considered and tried out by the department, and, if adopted, paid for. That proposal was put to Mr. Phillips, the Acting Works Director, and, although he agreed to it, nothing was done about it.

184. *To Mr. Howse.*—I do not believe that the difficulties I have described are peculiar to Canberra. They are Australia-wide. In Sydney a few weeks ago I spoke to a union official from Victoria who told me that the same trouble was being experienced by the building industry in that State. During the war a good deal of slackness took place, and many ex-servicemen, because of their war experiences, have returned with a feeling that they should not worry much about things. Undoubtedly many of the trainees under the Commonwealth reconstruction training scheme will eventually have to find their own level. These men are being trained for a period of two years. When, at the expiration of that period, their payments from the Commonwealth cease, it will be up to them either to sink or swim. I do not regard present-day rates of taxes as a disturbing factor among the workers. Genuine Australians know that the war must be paid for.

185. *To Senator Nash.*—Taxes are definitely lower now than they used to be. Any worker sees that in his weekly pay envelope. Two years ago I was paying in tax 28s. a week. My tax is now down to 14s. a week. I am an Australian and I regard this country as second to none in the world. It is only utter fools who regard some place overseas as being better than this country.

186. *To Senator O'Sullivan.*—The time taken to train a competent bricklayer would vary greatly according to the aptitude of the trainee. On an average, it would take five years to train a youth from the time he leaves school. A keen worker would become reasonably efficient within, say, three and a half years. It is silly to say that a man can become a trained bricklayer in from three to six months. The industry is not getting a reasonable number of recruits as distinct from trainees under the Commonwealth reconstruction training scheme.

187. *To Mr. Conelan.*—It is still necessary to obtain recruits from sources other than the Commonwealth reconstruction training scheme. In my view, within a few years, many of the trainees under that scheme will automatically drop out of the industry.

188. *To Senator O'Sullivan.*—Many of them will not make the grade. Many of them were attracted to the building trade because the work looked easy and the pay was good, and, in addition, they would be paid a government subsidy while they were being trained. The average age of the trainees is 21 years and the oldest among them would be about 26 years of age. I do not believe that incentive payments over and above the minimum wage now prevailing would be effective as a means of stimulating the workers to greater output. That is a ticklish point. Incentive payments are contrary to the policy of the Australian Labour party. And there is a good reason for that. If a man is gifted

he gets along in his job very smoothly. He may become so proficient that he leaves the average man a long way behind. The average man may take one and a half times as long to do a job as would a very gifted man. The difficulty about incentive payments is that the standard rates would be broken down. The average man has the same right to work and live as has the gifted man. That applies in every walk of life, as also does the fact that in all trades and callings some men stand well above the average. The result is that the average man is working "flat out" all the time and the man who is little below average does not last very long. The man below average may do a good job, but he is not able to do it as quickly as an average man or an outstanding man. Generally speaking, the fast worker is inclined to do rough work. In order to attain speed it is necessary to sacrifice accuracy or efficiency. The man below average—the man of 40 per cent. efficiency—would always be dragging behind and would have a grudge against his more efficient workmate. Under that system the slower man would always be penalized. Under a system of incentive payments, a slower man would be "flat out" all day trying to keep up with the more efficient man and the incentive pay would set the standard. All but the most efficient men would be dissatisfied. I know something of this matter because I have studied industrial psychology. The system of incentive payments would not tend to greater efficiency over the whole industry.

In the heavy industries, such as those controlled by Lysaghts, the Broken Hill Proprietary Company Limited and Rylands, there was formerly a system of piece-work at a flat rate. Over and above a certain production the men used to receive additional pay by the way of a bonus added to their wages. However, the bonus was whittled down gradually until it was not possible for any worker to receive more than 30s. a week above his classified wage. Many men of 45 years of age employed in those industries were worn out. They started in the industry at 17 years of age and had burned themselves up by the time they were 45.

180. *To Mr. McLeod.*—I would not say that during the past six or seven years there has been a shortage of competent bricklayers because tradesmen have gone into other kinds of work or have retired. If a man learns a trade, he usually sticks to it. Generally speaking, bricklayers stay in the building industry. The majority of them have grown to love their trade. I spent four years and ten months in the engineering trade during the war. I found that trade very attractive, but I still like bricklaying because I was taught that trade as a boy. When I joined the engineering trade, I was subsidized by the Government, but I would not like to have stayed in it. I believe that was the experience of many people who left the bricklaying trade during the war period. If the records were examined it would be found that 85 per cent. of the men employed in the industry as bricklayers before the war are still engaged in that occupation. Today, the ratio of trainees to experienced men is very much greater than it used to be. That would reduce the average number of bricks laid by men employed as bricklayers. Mr. Oliphant said that a good bricklayer could lay 900 or 1,000 bricks a day. I shall gladly bet him £10 to £100 if he can produce in Canberra any bricklayer who could average 1,000 bricks a day on cottage construction, either of his own design or of departmental design. I do not contend that experienced bricklayers are doing as much work as they did before the war. Before the war there was always an unemployed bricklayer watching the job and hoping to be taken on. That engendered a fear complex in the minds of the men, which drove them to speed-up to a degree which could not reasonably be expected of them.

190. *To Senator O'Sullivan.*—A good man to-day would be doing a fair thing on cottage construction if he laid between 600 and 650 bricks a day.

191. *To Mr. McLeod.*—A contributing factor to the slowness of building operations is the shortage of builders' labourers. Labouring in the building trade is hard work. Builders' labourers earn good money. Builders are paying as much to-day for labourers as for tradesmen.

192. *To Mr. Rankin.*—Most of the trainees under the Commonwealth reconstruction training scheme are keen to get on. Many of them are trying to do their very best. Nearly all of them are married. The building trade is a good trade and, generally speaking, the trainees like it. There are, however, certain of them who, after having completed two years of training, are not worth their wages. Some of the employers in Canberra refused to pay them 40 per cent. of the award wage and allow them to attend technical college classes one afternoon a week. The employers naturally say, "Why keep them on when they do not earn their wages?" Such men are to be found in the employ of the Government as well as of private enterprise.

193. *To Mr. Conelan.*—Mr. Oliphant, who gave evidence before the Committee last week, is an architect and not a builder. He prepares the plans and specifications of buildings, but he would either employ a builder to erect them or call for tenders for their erection. The best bricklayer in his employ, Charles Gumley, would not lay 900 bricks a day. He may be able to lay that number on a straight unbroken 9-in. wall; but with breaks and bays, he could not approach that number. A bricklayer cannot merely pick up a faced brick and lay it. The bricks have to be picked over. A bricklayer may have to pick up three bricks before he gets one suitable to lay on the wall. Private contractors employ trainees as well as competent bricklayers. The competent bricklayers would be put on the most important work.

The witness withdrew.

John Richard Jenkins, Secretary of the Australian Capital Territory Branch of the Building Workers Industrial Union, carpenter and joiner, sworn and examined.

194. *To the Chairman.*—I agree with what Mr. Somes has said in regard to the building industry in Canberra. He is a bricklayer and I am a carpenter; but my experience of the industry places me in a position to know that everything he has said is correct.

195. *To Mr. Conelan.*—Conditions in the carpentering section of the industry are similar to those in the bricklaying section. We have suffered much the same sort of disadvantages as Mr. Somes has outlined in respect of the bricklayers. One of the big disadvantages in regard to the speeding up of brickwork has been the lack of window-frames. Cottages have had to be left in a half-finished state, and bricklayers have had to be taken off and placed on other jobs. Scaffolding is tied up because it would be uneconomical to pull it down. Steel frames have been used but they must have lugs welded on to them to make them suitable. The engineers have been very busy on their own normal work and have not been able to get the steel frames out on time. Delays in supplying frames have held up cottage work to some extent.

One of the first disabilities we experienced on the resumption of building activities after the war, particularly in connexion with brickwork, was the shortage of builders' labourers. In many instances we found that men who had been competent builders' labourers before the war came back from the war looking for better jobs. Those who returned to their former avocation were often disgruntled. It was not long before

they had blisters on their hands because they were unaccustomed to pick-and-shovel work. They said, "This is not what we went through Greece and Croto for". Their unfavourable attitude for the work slowed the bricklayers down. A somewhat similar attitude might have been noticeable among other workers, including tradesmen. I believe that Mr. Oliphant gave some good evidence when he said there was a hangover from the war. I am of an opinion that some people are suffering from a very definite hangover, especially the younger men who served in the war. Many of them have not settled down. Among the older men, one of the things that is irritating them to-day is the fact that their wages, which look high, are of no great value to them. A man who was getting £9 a week a few years ago and is now getting £9 a week finds that the higher wage will not buy him the things that the lower wage did prior to the war. He says that when he was getting £6 a week he was able to save money. He is disgruntled about that and thinking and talking about it when he should be working. Those thoughts are depressing him and he has a feeling of frustration. When such a man goes home and his wife tells him she has had to pay 18s. 9d. for a pair of shoes for a six-years-old child, it breaks his heart. Similarly, he finds that he now has to pay 8s. 11d. for a pair of sandshoes which could be bought for 4s. 11d. before the war. The increase of £3 a week in his wages does not compensate him for the higher cost of living. Most of the older men with family responsibilities are in a bad state of mind about this. When all these things are taken into consideration, it surprises me that the average production is as high as it is to-day.

196. *To the Chairman.*—Some evidence was given on the question of average output. When calculating the average number of bricks laid or the number of doors hung, is the output of all men lumped together, including learners as well as experienced men or are the figures based upon the output of journeymen? The figures are undoubtedly based on the output of the whole of the men on the job. The Commonwealth reconstruction training scheme trainees can only lay as many bricks as their experience will enable them to lay. Apprentices are in the same position. If the output of all these men is lumped together to arrive at an average, the average will undoubtedly be low. This talk of low average output may make good newspaper reading, but it is not indicative to the true position.

The unions have taken a very keen interest in the Commonwealth reconstruction training scheme. As far as possible we have tried to ensure that there shall not be more trainees than tradesmen. If there are six carpenters or bricklayers on the job, we say the absolute saturation point is reached when there is one learner to each tradesman. We regard apprentices and reconstruction trainees as learners. We do not want learners working on their own or with other learners or apprentices.

197. *To Senator Nash.*—Before the war we allowed one apprentice to three carpenters. Other trades follow much the same ratio. We realize now, however, that times are abnormal and that the building industry must be stimulated and, accordingly, we are prepared to abandon orthodox ideas on this subject. I know one or two jobs on which the men employed are almost entirely trainees, but we know that the bricklayer looking after them is a good man, is interested personally in their welfare and is doing everything to help them. He is making up whatever deficiency might otherwise be apparent and is taking a keen interest in supervising the work of the trainees, guiding them in every way. On many other jobs, however, that would not be done.

198. *To the Chairman.*—The work of carpenters has been previously held up because of shortage of materials. I could tell the members of the Committee stories in

that regard that would horrify them. It is true that there has been much improvement of the position. The unions have gone to the authorities and have made suggestions, as a result of which improvements have been effected. In certain instances improvements have directly resulted from representations made by the unions and the pressure exerted by them. In other instances the improvement has merely been part of the general trend. We can see the general trend of improvement every day. I had a conversation recently with a leading hand bricklayer on one of the biggest building jobs here, a man whom I have known for 25 years in Canberra, and a very competent bricklayer. What he told me bears out completely what Mr. Somes has said. He and Mr. Somes are in no way connected. I asked this man had he read the evidence given by Mr. Oliphant. He replied that he had, and that assertions that a man could lay 1,000 bricks a day on cottage construction was just so much moonshine. He said it might be done on some work but only on straight walls and footings. He expressed his opinion that a good average for a competent tradesman would be 400 or 500 a day, and if reconstruction trainees were employed the average might be brought down to 300 a day. The shortage of hardwood has been one of the great bugbears to the building industry. The authorities here have installed a hardwood mill and progress is being made in overcoming the shortage, but it still exists. The position in relation to the supply of tiles is well known. One needs only to go around this city to see the number of bare roofs awaiting tiles. Even the tile position, however, is improving gradually.

199. *To Senator Nash.*—You say that Mr. Oliphant made a statement that carpenters used to hang twelve doors a day and now they hang only four doors. Workers have a word which adequately but not very politely describes such statements. I am 41 years of age and have been working in the carpentering trade since I was thirteen, and I have never met the man who could hang twelve doors every day in such a way as to ensure that they would function. However, I have heard—and I do not disbelieve it—that on odd occasions a carpenter has hung twelve doors in a day. The point I make is that no carpenter could maintain that rate. Some accidental circumstances may make such a task possible. The statement made before the Committee is definitely untrue.

This morning I rang the foreman in charge of the construction of one of the biggest groups of cottages in Canberra. He is employed on a government job where, if you believe some people, men are supposed to drag the chain. I asked him how many doors his men were hanging. He said, "My men have been hanging eight doors a day". Members of the Committee could inspect the job and check on the accuracy of these statements. The work is going on now and may be inspected at any time. These doors are flush type maple doors, not easy to hang because of the glue in the plywood which blunts the plane irons.

I interviewed the foreman of another job and asked him how many doors his men were hanging. He told me they were averaging six doors a day. At that time I had not contacted the man who told me his men were hanging eight doors a day. I ascertained that on the job where six doors are being hung the percentage of Commonwealth reconstruction trainees is greater than on the job on which the average is eight doors. The job on which the output is greater is one of the first day-labour jobs to commence here since the war. The men employed on it have been going from group to group of construction jobs. On

that job there is a bigger percentage of journeymen. These were two-hinge doors of the ordinary type. I have been employed hanging doors in Canberra when other men have been waiting to get my job if I were not good enough. I was then hanging eight soft-wood doors a day. The contractor with whom I was employed, who was reputed to be the hardest man to work for in Canberra, was quite satisfied with that number. For a carpenter to achieve the rate of twelve doors a day he would need also to be fitting the door-jamb and would need to know the exact size of the doors in advance. He would probably make his door-jamb a little bigger than the doors so that he would only need to take a shaving off the doors to fit them. In such circumstances, with careful planning, it may be possible for a good man to hang twelve doors a day; but these conditions do not exist. In all the time I have spent in the industry I have never been able to put my finger on a man who could hang from twelve to fifteen doors a day. It is true, however, that I can sometimes find a man who knew another man who could do so.

Mr. Oliphant's statement in regard to the output of bricklayers and to the average number of doors hung a day, has made him the laughing stock of Canberra. His statement that the average number of doors hung by each man in a day is four has, I think, been completely refuted. The Committee might think it worth while to inspect the work now being done.

200. *To Mr. Russell.*—Generally speaking, carpenters are just as efficient to-day as in earlier years. I have noticed the tendency to some slackness on all sides. I attribute that mostly to the state of mind of people to-day, among the younger men for one reason, and among the older men for another reason, with which I have already dealt. There was a much better tempo among workers during the war. They felt that they were making sacrifices, but were glad to do so in order to help the war effort. On defence work during the war period we worked night and day, Saturdays and Sundays. The organization was good. There was no shortage of materials then. When Mr. Orwin was Assistant Works Director to Mr. Mehaffey, I visited their office to discuss some union matter. Mr. Orwin told me in the presence of Mr. Mehaffey that the progress of defence works in the Territory was excellent. He said that the work had been done below cost and had been finished before the estimated date of completion. He said it was very pleasing indeed. I said, "That looks like a good argument for day labour". He said, "That has not always been the story"; and he informed me of certain jobs that had not come out too well before the war. I could tell him of some others. Before the war on many day-labour jobs, supplies of materials were not kept up and drive and organization were lacking. In the war years all that was changed. The men, the leading hands, the foremen, the clerk of works and the architects were all on their toes.

201. *To the Chairman.*—The departmental officials are not as sympathetic towards day labour as they should be. Perhaps I should qualify that by saying that, under a system of general contract work, their job is much easier. They draw up plans, take out estimates and quantities, and then pass on the work to the contractor. They send a clerk of works on to the job to stand over the contractor and see that he does the work properly. On a day-labour job the position is quite different. They have to get around the job and instil some enthusiasm into the men in charge. They have to do very much more in the way of regulating

supplies of materials and overcoming bottlenecks. It is human nature to get along in the easiest way possible to a certain extent.

202. *To Senator O'Sullivan.*—Government controlled day labour seems to lack drive and efficiency in some instances. I do not know why that should be so. However, I do not believe the position to be irreparable. We have risked making ourselves unpopular by going to the Acton offices and having long interviews with the officials there in an attempt to put forward our ideas from a practical point of view. We have invariably been given a patient hearing and some of our suggestions have been adopted. For instance, we were instrumental in having the building of one type of cottage abandoned. In that design there were more bricks above the ceiling line than there should have been and too much steel to support brick work over long stretches of windows and under gables. Some cottages of that type had been built, however, and bricks, material and labour were wasted on them. As the result of our representations other details in design were remedied or modified. It is ridiculous that men working on the jobs should have to go to an architect to point out constructional faults of that kind. We did it, however, because we could see the waste that was going on.

203. *To Senator Nash.*—There appears to be a belief in some quarters that the unions tell the men that they are to do only a certain amount of work. That is not so. All we say is that we do not want our members made slaves as they were before the war. I worked for private contractors before the war and in order to keep my job, had to work harder than any body should have been asked to do. Furthermore, I had to "slum" work. On one job on which I worked the contractor told me that if the clerk of works was absent at the appropriate time not to put lead-flashings under the windows but to get the windows covered up with the architraves so that he would think they had been put in. I had to carry out those instructions or I would have been sacked. I gave sworn evidence along these lines to another body.

There appears to be an opinion in some quarters that the unions are a drag on the men. Union officials and executives have gone out of their way to speed things up. We have lectured men at meetings about the housing position. We have told them that if the cost of a cottage is higher than it should be, a working man will be the victim. Shop and job stewards are selected from men who have some influence in stirring the men to do their best. At meal breaks, or when sheltering from the rain, they talk things over with the men and steer the conversation to a discussion as to the advisability of increasing output. On a day-labour job a man is really working for himself, because it is paid for by the taxpayer. The Government has always been a reasonable employer. I have found that so, irrespective of what Government has been in office. We have always told the men that the Government does not treat the workers badly as do private contractors, many of whom use every device in order to escape-payment of holiday pay and the like to their employees. We have urged our members to give of their very best. Shop stewards have been instructed to talk to the men along those lines. If a union official said to a worker, "You are doing too much work", he would immediately be dealt with by the union.

I understand that in his evidence Mr. Oliphant said that a good worker would hang twelve doors a day. I mentioned the figure of fifteen. I have heard it said that architects have claimed to know men who could hang fifteen doors a day.

The witness withdrew.

(Taken at Sydney.)

MONDAY, 8TH DECEMBER, 1947.

Present:

Senator LAMP (Chairman).	
Senator Nash.	Mr. McCleod.
Senator O'Sullivan.	Mr. Rankin.
Mr. Beale.	Mr. Russell.
Mr. Conelan.	

David Victor Isaacs, M.C.E., M.Inst.C.E., M.I.E.E., Aust., Director, and Oscar Andrew Bayne, Assistant Director, Commonwealth Experimental Building Station, North Ryde, Sydney, sworn and examined.

204. *To the Chairman.*—Mr. Isaacs.—To tell you the functions of the Commonwealth Experimental Building Station in a short space of time would be difficult, but a booklet issued a couple of years ago, entitled *Commonwealth Experimental Building Station, North Ryde, Sydney: A Brief Explanation of the Organization and Work of the Station*, gives an idea of what we are doing. I refer you to:

Introduction—

1. The objects and functions of the Station.
2. The work of the Station.
3. The organization of the Station.
4. Co-operation and liaison with the Industry and Government Departments.

The station is concerned with building research generally, except research into building materials, which is the responsibility of the Building Materials Research Section of the Council for Scientific and Industrial Research. I will explain the difference between our work and that of the Council for Scientific and Industrial Research. The Building Materials Research Section covers building materials as such. For instance, it does all the research into the properties of concrete—its strength, its qualities as a mixture, that is whether it is a harsh or workable mixture, its thermal qualities, that is whether it transmits heat readily and how much heat it does transmit. The same line of approach applies to other materials. Take, for example, wall boards. They are examined for physical and material properties by the Council for Scientific and Industrial Research. We take over the examination of the possibility of using the materials in building construction. By that I mean that, knowing that there is an acute housing shortage, we may discover substitute materials for those in short supply, or how to make better use of existing materials. For instance, we can use asbestos cement in a corrugated instead of flat form as you saw at the station.

205. *To Mr. Conelan.*—We have been told that manufacturers will supply particular materials if they receive a sufficiently big order from the Housing Commission of New South Wales or any other authority or private company undertaking the building of a large number of houses. Another illustration of how materials may be saved is this: Bricks are ordinarily laid on the flat, but we have recommended the use of brick-on-edge construction in external and internal walls. That gives 3-in. instead of 4½-in. thickness. That has no reference to the Council for Scientific and Industrial Research. Where we obtained its help, for instance, was on the size, shape and thermal qualities of concrete slabs for housing purposes. We intend building a complete house of special concrete slabs to show their practicability. Concrete houses built in Queensland are not of the same design as ours. There is nothing like this design elsewhere in the world, because there are fundamental differences in the basis of design. We hope to make changes in

traditional construction, such as laying bricks on edge instead of flat and the use of smaller timber for floors, in order to economize through the better use of materials. We hope to improve the quality of construction without increasing costs and, if possible, to get cheaper construction. Our big job is to bring costs down. We must get stable construction, proof against the elements of wind and rain. Buildings must also be insulated against extremes of heat and cold. That applies to the building of offices and factories as well as houses. It is possible that we shall be able to give good advice about the proposed new administrative block at Canberra for the Council for Scientific and Industrial Research. We can give advice on all new forms of building construction.

206. *To the Chairman.*—In order to popularize the construction of our design of concrete houses, we will invite the State Housing Commissions to inspect the completed dwelling. Another construction that you saw on Saturday during your inspection of the station is the standard kitchen. We intend to do the same thing there. We have had a representative of the Victorian Housing Commission out and we hope that a representative of the New South Wales Housing Commission will come to look at it. We hope to get a rough price for large-scale production of that kitchen. Then we hope to have it accepted by the Housing Commissions and any one else interested. I feel that the only way to get people interested in our corrugated asbestos cement is by getting them to look at it. What does it cost? What is it like to live in? We shall give a satisfactory answer.

207. *To Mr. Conelan.*—The cost of our corrugated asbestos cement should be slightly below or about that of ordinary corrugated asbestos. The flat sheet is cheapest. Ours involves the same type of work as the manufacture of corrugated asbestos, but we get slightly more cover. We anticipate from our discussions with manufacturers that in large-scale production the cost would be about the same or slightly cheaper. Corrugated sheets would cost a little more than plain. I could not tell you the actual difference in the costs. You must realize that you get a higher quality of construction from this sheet. That house would cost more than an ordinary asbestos cement house but less than a brick house, and will give you in internal comfort, general stability and suitability something between brick and ordinary asbestos cement construction.

208. *To the Chairman.*—We have been operating for three and a quarter years. I am asked what discoveries of ours are used by commercial builders. The commercial people are a little slow in accepting new ideas. We have interested housing commissions in smaller foundations and smaller-sized timbers for flooring. Nine months ago the conference of the Commonwealth and State Housing Commissions agreed to adopt smaller foundations and smaller timbers for floors and walls. People have to be persuaded to use novel methods.

209. *To Mr. Conelan.*—By "smaller timber" I mean 3-in. by 2-in. instead of 4-in. by 2-in. joists. Eighteen months ago we advocated 9/16-in. instead of 13/16-in. hardwood floor-boards. Floor-boards of 9/16-in. thickness are cut from 4-in. stock, whereas 13/16-in. thick boards are cut from 1-in. stock. That gives you 33 per cent. more floors from the same quantity of wood. Flooring is a bottleneck in the building industry. The Victorian Housing Commission is about to build a house with the thinner floors. Our work is beginning to bear fruit now. These things are hard to put across. The same thing applies to brick-on-edge construction, which is being accepted

against opposition. Bricklayers do not like it. Nevertheless, they are adopting it. After persevering, they are convinced it is cheaper. The same thing applies to everything we do. We must break down opposition.

210. *To the Chairman.*—The mechanical hoist that the Committee saw at the station is about the first piece of special equipment we produced. We intend to place it on demonstration. Plant that we ordered eighteen months ago from England has not yet been delivered. We have "propaganda-ed" no-fines concrete construction for some time. Eighteen months ago, we wrote a building code covering the use of no-fines concrete construction in building. We have reached the stage at which we are going to build a house in Canberra by the no-fines concrete construction method. We had to get the authorities there to agree. I have produced copies of building codes that we have written to cover new forms of construction. We have been asked to produce codes for particular authorities. They have been adopted almost verbatim. They are law in the New South Wales sphere and could be law all over Australia if people were interested.

Glass bricks and tiles are not cheap and we would not consider their use in low-cost work. Plastic materials look very nice on paper but they are expensive. Plastics will be adopted in building, but only for fittings like electric light switches. They will not be adopted on a big scale. We shall not have plastic houses in our lifetime. They may be built in the far distant future.

211. *To Senator O'Sullivan.*—The Standards Association was very interested in the standard door and window-frames. It looked hopeless to get agreement, but our representative managed it, and the manufacturers produced standards based on our recommendations. The Standards Association will go into the matter of standard-size floor timbers. The adoption of our recommendations by the Standards Association would give them official standing. The differences between the cost of brick-on-edge and brick-on-flat construction is only a few pounds, say £30, in the cost of a house. With brick-on-edge construction you get an effective height from each brick of $4\frac{1}{2}$ inches instead of $3\frac{1}{2}$ inches. An argument against brick-on-edge construction is that it requires more labour because it is harder to lay bricks that way. There is a fair saving in the cost of the material, but some authorities say that there is no saving in the cost of labour and other authorities claim that there is a loss of labour. The saving in bricks and mortar would be 25 per cent. Labour represents 50 per cent. of the total cost, and that must be taken into account. At first, bricklayers might be slowed down by the brick-on-edge method until they become used to that system.

The 8-ft. ceiling height must be accepted by the municipalities before it can become a real thing. We are absolutely confident that an 8-ft high ceiling is quite satisfactory for health. In fact, people living in houses with ceilings of that height are better off in some respects, because the windows can scavenge the warm air from the ceiling. You get a quicker change of air and you can take better advantage of a cool change by having less heated air. Then there is less weight of material in walls. It must be cheaper because the mode of construction is not altered. There is no advantage in high gables because we have little snow country. Tiles must be waterproof. A pitch of $27\frac{1}{2}$ degrees is usual.

212. *To Mr. Rankin.*—We have experimented with concrete brick construction. We got a machine out from England to make experiments, but the Department of Works and Housing wanted it. We have prepared a code, which has become law in New South Wales, in respect of concrete brick construction. We

feel that a lot of the manufacture of concrete bricks and blocks has been by people who do not understand the pitfalls. We encourage manufacturers to come to us with the bricks. We test them to ascertain whether or not they comply with the code. It may be that buildings are put up that do not comply with the code. We know that concrete bricks can be satisfactory. Much experimental work has been done in connexion with the water-absorption of building materials. There is no reason why materials which have a fairly high water-absorptive capacity should not be used for internal walls. Bricks absorb water but dry out. Dense concrete may not absorb much water.

213. *To Mr. Russell.*—We are finding it hard to get technical staff, principally because the salaries offered are not quite attractive in comparison with salaries outside. We have lost good men. Secondly, there is a comparative shortage in Australia of men of the type we need. While there is competition for them, we must suffer if our salaries are not high enough. Theoretically, there would be men overseas who could migrate to Australia and join our staff, but in order to attract them we would have to pay higher salaries. That is the hurdle that must be overcome. Basically, in relation to qualifications, it is no use saying, "I want an engineer or an architect". The man required is a competent man with an independent outlook. Therefore, he must be experienced and with high qualifications. A man with experience and high qualifications wants a lot of money. Our estimates are made in the ordinary way. We have felt that perhaps we ought to be voted a little more money than we have been. Had we had more money we might have done more. We are bound by Public Service Regulations. We have always tried to present honest estimates of our needs, but there is always a pruning. We are in some difficulty about building materials—steel, timber, bricks, fibrous plaster. Whatever we want we are up against problems. The Housing Commission has co-operated by giving us priorities for bricks. Business concerns have supplied us with cement, but supply difficulties have caused delays.

You ask me whether we are getting co-operation from all departments. It depends. If you say "housing commission", the Victorian Housing Commission has been co-operative, but we have not received what we should have liked from New South Wales. It has taken time for the right mind to develop among those capable of using our advice. Do you say "New South Wales has not given you full co-operation"? I do not think they are imaginative enough. There is a distinct contrast between the approach of the people of Victoria and New South Wales—I will not say there is lack of imagination, but we have not seen the imagination we should have liked to see from New South Wales. If we had, there might have been better results.

214. *To Senator Nash.*—In each year our estimates have been cut by 25 per cent. or more. The estimates that have gone to the Parliament have been pretty well as we have put them up.

215. *To the Chairman.*—You ask me whether they have been cut by the Department of Works and Housing. Yes; it amounts to that.

216. *To Mr. Russell.*—You ask me whether the reduction of our estimates has impeded our investigations. We need equipment and buildings. I was asked about houses. We could spend a lot of money in bringing equipment from overseas. As you will appreciate, in doing the work we do, we must have good equipment. We have made equipment and plant ourselves. We have cut our coat to the material. We have had to put off doing certain things until we get more money.

217. *To Senator Nash.*—Some of the better-known architects have been in touch with us, but we hope for more co-operation from them. Only a few are prepared to go ahead with what we recommend. Some architects have asked us to determine the causes of wall cracks. We have recommended to architects that they provide for the use of smaller sizes of timber, but we do not know how far we have got. We issue literature to the building trade and we have had a good response. We circularize engineers and architects and certain people in the building trade, saying, "Here is a list of the matter we have prepared at 1s. or 2s. a copy. If you want it, send in your order". We have had £800 worth of orders. Practical builders have viewed our work on the soil cement wall. They are becoming interested in it. It appears to have stirred outside imaginations quite a bit. We gave the Department of Local Government a copy of our notes on that form of construction. Copies have been circulated among municipalities in New South Wales. We have had inquiries from them. One local builder intends to try the method out. It may be that the strength of the wall is not so great as that of a brick wall, but that does not matter. I am confident that the walls we have experimented with are strong enough. I am not necessarily referring to soil cement walls. You can mix clay and sand in the right proportions and get a stable mixture. It is vastly improved with the addition of 10 per cent. of cement or some bitumen. If you use a mixture of plain clay and sand, you may have to render it. We are experimenting on that and have not yet got the final answer.

218. *To Mr. McLeod.*—It may be possible to demonstrate a model *pisé* house. That type of house would be useful in the dry interior; the material takes quite a while to warm up. It does not warm up to anything like the extent of asbestos cement. It is cool in the day time and it would take a long hot spell to bring the temperature up to an uncomfortable degree. Assuming that it is possible to use some mechanical methods, the cost of construction would be lower than for brick. We do not believe great skill would be needed in building. We must see what can be done to enable casual builders, perhaps farmers, to go ahead with construction with a few simple directions. We hope that more or less unskilled people will be able to undertake *pisé* construction.

We have adopted light timber trusses on the outer wall to outer wall principle for roofing. That enables the inner partitions to be of light material as they are not required to take the weight of the trusses. We consider that the trusses used hitherto have been heavier than is necessary.

219. *To Mr. Conelan.*—Our recommended codes of practice for various materials are supplied to the Standards Association, Housing Commissions, appropriate public departments, municipalities and anybody interested who writes asking for them. In New South Wales we send copies direct to the Department of Local Government, which examines the codes recommended and when they are adopted by it they are binding in the State. The code on concrete blocks is law in New South Wales. The Standards Association has gone into these things, but our own authority carries weight with people who know us.

220. *To Mr. McLeod.*—*Mr. Bayne.*—We have many inquiries from the building industry generally, particularly from the professional side, concerning many different kinds of troubles. It is from those inquiries that we build up our programme, because they indicate what is troubling the industry.

221. *To Senator O'Sullivan.*—We give as complete an answer as we can from our own knowledge and literature. If experimental work is necessary, we go

to the inquirer and say, "This will cost money", and ask him to finance it if it is an individual matter. We finance it if it has general application.

222. *To Mr. Beale.*—We prepare an annual programme of work as far as we can in advance. That programme is built up from individual inquiries from the industry, government departments and housing authorities. Conferences of the housing authorities indicate to us their prime needs. Our programme is built up on that background. That programme is utilized after discussion with the Department of Works and Housing, but it must be flexible. We are frequently delayed by lack of equipment and specialists. We may intend to do certain work, but cannot get, for a considerable time, the equipment with which to do it. We are in touch with the Institutes of Architects in the States, but I agree that they do not use our facilities as much as they might. That is quite natural, because ours is long-term work. Our contact is primarily with the architect in trouble, and those contacts are valuable because the men concerned learn that we can sometimes help them. Architects and engineers do not worry research organizations unless they are in trouble, because they are inclined to adopt established methods and do not explore uncharted fields. The general practitioners will wait until we have proved new forms of construction before they adopt them for use. They are handicapped by local government building regulations in the adoption of novel methods. In every country it is difficult to make regulations sufficiently specific to adequately control building and sufficiently elastic to allow new development. Because the New South Wales regulations did not permit concrete-block construction, we had to create entirely new codes for that kind of construction. That work has gone further in New South Wales than in other States. In Victoria no flues are allowed unless they are brick-work. The authorities there have asked us to draft new regulations which will permit the use of light metal and other light construction for domestic flues. We have not directed propaganda to Municipal Councils. I do not like the word "propaganda". Our publications are very detailed and technical and are not suitable to be read by the normal builder or most normal architects. I think we shall have to set up a separate system of documents interpreting our detailed documents. The detailed documents will become library publications, and simplified interpretations will be issued to the normal industry.

223. *To Mr. Russell.*—I agree with Mr. Isaacs that higher salaries are needed to induce specialists to join the staff of the station.

224. *To Mr. Conelan.*—There is no training course for building scientists and there is no established profession. We have to draw on practising engineers and architects for men with the background we need and then warp them into exploratory work. We are competing with the professions and we cannot always get the men we want. In the scientific field we are competing for men not so much with commerce as with the Council for Scientific and Industrial Research. We have not as many engineers and architects as we need.

225. *To the Chairman.*—*Mr. Isaacs.*—We have six vacancies for "top" men. I have been trying for ten months to get an engineer of a certain type. It is merely because we cannot offer a sufficient salary that I have not been able to fill the vacancies. We are bound by the Public Service Regulations.

226. *To Mr. Russell.*—Our work is impeded by our lack of staff. I advertised for an architect and did not get a reply. I am confident that we should receive applications for the jobs if the salaries offering were high enough.

We have done work at Mildura. We are starting at Broken Hill and Townsville. We intend to carry on at Darwin and, if necessary, we shall operate in New Guinea. Working with small-scale models, however, we can duplicate tropical conditions at the station here.

The following is a schedule of all special reports prepared by the station since its inception. These reports are prepared on a request being received from a responsible organization and are regarded as confidential. A limited number of copies only are available and copies are not made available to the public except with the express approval of the sponsor of the proposal reported on:—

5/1.—Report on the Dampney system of house construction. By F. G. Hole, 1946.

5/2.—Second report on the Dampney system of house construction. By F. G. Hole, 1946.

5/3.—Report on the Dampney system of house construction. By F. G. Hole, 1946.

6/2.—Second report on system of house construction sponsored by E. J. Millar. By F. G. Hole, 1946.

7/1.—Report on the Rose system of formwork for concrete house construction. Prep. by D. V. Isaacs and W. P. Brown, 1945.

7/2.—Report on the Rose system of house construction. By H. E. Tasker and John E. Ferris, 1947.

16/1.—Report on a pre-cast concrete-slab house erected at Pagewood, New South Wales, by D. Poplewell. Prep. by D. V. Isaacs and S. E. Ancher, 1946.

19/1.—Report on a prefabricated plywood house erected at Balwyn, Victoria, by Messrs. Romoke Proprietary Limited, and Messrs. Jennings Construction Company. Prep. by D. V. Isaacs and W. P. Brown, 1945.

74/1.—Report on concrete blocks proposed by Becketts Pty. Ltd. By F. G. Hole, 1946.

82/1.—Report on test on light steel roof trusses. By F. G. Hole, 1946.

82/2.—Report on tests on steel angle-to-timber fixing clips. By D. Dalgleish, 1947.

88/1.—Report on the Monocrete system of construction. C. C. Pencock, patentee, development by Monier Industries Ltd. By D. V. Isaacs and M. H. Norris, 1946.

89/2.—Report on Monocrete house erected at Noble-avenue, Bankstown, by Farmholmes Pty. Ltd., for the Housing Commission of New South Wales, 1946. By R. O. Phillips and A. F. Boyd.

94/1.—Report on tests carried out on pre-cast pre-stressed concrete panels. By A. F. Boyd, 1947.

94/2.—Report on electro-curing of concrete. By A. F. Boyd, 1947.

157/1.—Report on two houses with external walls and roofs of Steelox steel sheet panels, located at Solander-street, Matraville, New South Wales. By R. O. Phillips and H. E. Tasker, 1947.

190/1.—Report on a house constructed with "Denaro" pre-cast concrete blocks erected for the New South Wales Housing Commission in Penrose-street, Lane Cove, Sydney. By M. H. Norris, 1946.

200/1.—Report on the Beaufort house being constructed in Melbourne by Department of Aircraft Production. By D. V. Isaacs, O. A. Hayne and J. E. Allsop, 1946.

208/1.—Report on the "Seco" System of construction sponsored by Uni-Seco Structures Ltd., London. By Marcus H. Norris, 1946.

213/1.—Report on the construction of the Arcos steel house, produced by Arcos Electric Arc Welding Products. By D. V. Isaacs and others, 1946.

232/1.—Report on the use of tapered masonry preswood for floor covering on (1) a solid sub-floor construction and (2) a sub-floor consisting of bearers and battens at various spacings. By R. Borovich and H. E. Tasker, 1946.

278/1.—Report on a house of in-situ concrete with terra cotta block facing, erected for the Housing Commission of New South Wales, by C. F. Gage. By R. O. Phillips, 1946.

283/1.—Report on the construction of the second Myer pre-fabricated house, by D. V. Isaacs and O. A. Hayne, 1946.

291/1.—Report on steel framed strawboard and cement-rendered house erected at Earl-street, Granville, New South Wales, by Insulated Houses Pty. Ltd. By F. G. Hole, 1946.

298/1.—Report on the transverse strength of corrugated asbestos cement roofing sheets. By A. F. Boyd, 1946.

309/1.—Report on house of pre-cast concrete slabs with infilling of in-situ concrete, by Tuck, "Stonite" in course of erection for the Housing Commission of New South Wales. By R. O. Phillips, 1946.

312/1.—Report on a house of reinforced cement mortar cavity wall construction by Brook Bros., erected for the New South Wales Housing Commission in Ellen-avenue, Dee Why. By J. E. Allsop and J. E. Ferris, 1946.

313/1.—Report on a house of reinforced cement mortar wall construction by "Colarnoo" Pty. Ltd., erected for the New South Wales Housing Commission. By J. E. Allsop and J. E. Ferris, 1946.

313/2.—Supplement to 313/1.

314/1.—Report on a house of pre-cast concrete construction by J. M. Cornish, erected for the New South Wales Housing Commission. By J. E. Allsop and J. E. Ferris, 1946.

315/1.—Report on steel house constructed from pre-fabricated units on lot 17 Northcote-road, Bankstown, New South Wales, by Steelok Homes (Aust.) Pty. Ltd. By J. L. Browne and H. E. Tasker, 1946.

316/1.—Report on house with pre-cast concrete slab walls erected on block 21, Hillcrest-avenue, Bankstown, New South Wales, by "Ring" Homes. By J. L. Browne and H. E. Tasker, 1946.

319/1.—Report on house having pre-cast concrete slab walls erected . . . by Steelok Homes (Aust.) Pty. Ltd. By J. L. Browne and H. E. Tasker, 1946.

330/1.—Report on a single storey office building of steel frame and reinforced wood-cement mix erected for the sponsor H. G. Jager, Esq., at 117 Church-street, Ryde. By J. L. Browne and A. F. Boyd, 1947.

355/1.—Report on the "Truline" brick machine and "New Method" bricks. By J. L. Browne and J. Ferris, 1947.

364/1.—Report of tests on pre-cast concrete masonry units manufactured by W. J. Sloper. By J. L. Browne and A. F. Boyd, 1947.

372/1.—Report on "Sectionit" pre-fabricated houses manufactured and erected by Messrs. Vandyno Bros. By J. L. Browne, 1947.

376/1.—Report on houses of partly pre-fabricated timber frame by Hutcherson Bros., erected for the Housing Commission of New South Wales. By J. L. Browne, 1947.

A series of technical memorandums has recently been established in which are recorded all minor technical matters engaging the attention of the staff, including results of day-to-day tests, replies to inquiries, results of searches of published information, &c. These memorandums are regarded as confidential and not made available to the public, but where they are suitable they are used in reply to inquiries. Where these memorandums are considered to be of general interest they are circulated to all Directors of works and other interested persons. The following is a schedule of the technical memorandums issued to date:—

SCHEDULE OF TECHNICAL MEMORANDUMS ISSUED TO 26TH NOVEMBER, 1947.

Technical Memo. Number.	Title.
1	Some Factors Affecting Building Design and Town Planning for Tropical Towns
2	Water Penetration Tests on System 94 Precast Concrete Panel System
3	Kitchen-Laundry-Bathroom unit produced by Kimball Adeney
4	Living Quarters at Carlton Reach, Ord River, Western Australia
5	Tulloch Econo Steel House
6	The Helicon
7	Weatherproofness of Concrete Tiles
8	Wind Velocities at height of 70-ft above ground level
9	Report on light R.S.J. Test Piles to various depths at Villavood
10	Report on tests carried out at Station on bearing capacity of 4" x 3" R.S.J's
11	Water Penetration Tests on Concrete Roofing Tiles interlocking shingle pattern, supplied by A. J. Becchio
12	Weather Penetration Tests on Concrete Roofing Tiles, marcellite pattern, supplied by New South Wales Housing Commission
13	Tests on Clay Tile from Department of Building Materials—Project 386

SCHEDULE OF TECHNICAL MEMORANDUMS ISSUED TO 20TH
NOVEMBER, 1947—continued.

Technical Memo Number.	Title.
14	Tests on Tiles supplied by O. Bayne—Source France—Guichard Carvin & Co.
15	Tests on Roofing Tiles—Source—Australia—C.E.D.S.—Vunderlich
16	Tests on Roofing Tiles—Australia—Ralph Williams, Strathfield
17	Tests on Roofing Tiles—Australia—A. J. Beechio, St. Ives
18	Tests on Clay Building Bricks— (1) Lithgow Vale of Clydd (2) Butcher Bros, Artamon
19	Tests on Roofing Tiles Downside—Porter & Galbraith
20	"Oakred" Sawdust Asbestos Flooring Material, Confidential
21	Holmesglen Housing Factory—Concrete Tile Making, Confidential
22	General Provisions for the Installation for Self Contained Solid Fuel Burning Appliances
23	Production in Building & Civil Engineering Analysis of Man Hours and Machine Hours
24	Notes on Design of Domestic Buildings in Southern Australia
25	Murray Valley Resources Survey
26	Beaufort House—Notes Regarding Anticipated Thermal Performance
27	Trends in Australian House Construction and Design
28	Water Penetration Tests on No-fines Concrete
29	No-fines Concrete—Nailing Battens to Walls
30	Work of Station—For Advisory Committee.
31	Renderings of No-fines Concrete Walls
32	Roof Slopes
33	Report on Mould Growth
34	Tests on No-fines Concrete Construction Joints, Project 338/7
35	Tests on Concrete Roofing Tiles—Concrete Industries
36	Water Penetration Tests on the Flashing of Frames in No-fines Concrete
37	Results of Tests carried out Dunbrick Bricks
38	External Rendering on Wire Mesh and Expanded Metal
39	Weather Penetration Tests on Pressed Zinc-anneal Roof Sheetting, manufactured by Wunderlich
40	Weather Penetration Tests on Concrete Roofing Tiles (marseilles pattern), manufactured by W. J. Reynolds
41	Report on Tests carried out in conjunction with the manufacture of Precast Masonry Units by the "Trianco" Automatic Block and Slab making machine using Canberra Aggregate
42	Lime Cement Concrete
43	Workshop Report on Trianco
44	Absorption Tests on Concrete Tiles, manufacturer R. J. Reynolds
45	External Renderings—Proposals for the investigation of the causes for and possible methods of prevention of cracking and crazing of external rendered surfaces
46	Donaro Air Flow—Brisbane—Supplied by L. F. Stuckey
47	Programme of Work Proposed, October, 1947, March, 1948
48	Animal Health Laboratories, Alice Springs—Considerations arising from discussions with Dr. Seiden, 18th September, 1947
49	Station's Hot Water Boiler
50	Deflection Tests on Steel Forms for No-fines Concrete
51	The Preparation of Vibrated Concrete Surface for Plastering
52	Weather Penetration Tests on Pressed Zinc-anneal Roof Sheetting
53	Self-contained Solid Fuel Burning Appliances
54	Weather Penetration Tests on Clay Roofing Tiles (marseilles pattern)
55	Weather Penetration Tests on Concrete Roofing Tiles
56	Gas and Electric Water Heater for Domestic Automatic Hot Water Services
57	Durability of Galvanneal Wall Tiles
58	Testing of Six Solid Precast Concrete Units for H. Russell
59	Brick Wall Reinforcement
60	The Basic Idea of the unit Kitchen built at the Station
61	Brickette Failure in Domestic Fireplace

SCHEDULE OF TECHNICAL MEMORANDUMS ISSUED TO 20TH
NOVEMBER, 1947—continued.

Technical Memo Number.	Title.
62	Flat Roof Construction Tested at Station requested by Department of Works and Housing
63	Manufacture and Testing of Concrete Bricks—Confidential
64	Estimates for system 94
65	Report on System of Prefabrication using Asbestos Cement Sheet
66	Notes of the system of flat roof construction used on the extension to the G.P.O. and Naval Stores Building—Garden Island, Sydney
67	Protection of Steel Building
68	Flywire in Doors
69	Portable Builders Hoist
70	Inspection of Timber Shuttering for No-fines Concrete, J. Garrett
71	Manufacture and Testing of Concrete Bricks
72	Truine Brickmaking Machine
73	Manufacture and Testing of Concrete Bricks
74	Liner Block and Slab-making Machine
75	Horizontal Dampproof Course
76	K.H.B. System of Construction. L. Roubaudi
77	The use of Aluminium for Roofing
78	Timber Floor Substitutes
79	Jackson's Concrete Products
80	Concrete Roofing Tiles—Summary of work done

No further codes of practice are at present being prepared. The following is a schedule of the more important general inquiries received in recent months:—

Reference Number.	—	Classification of Inquiry.
420	Shire of Patrick Plains	Concrete Tiles
421	Shire of Wacol— Request for advice on use of Woodtex (Woodwool) board	Woodwool
426	Municipal Engineer, Wagga— Advice re proposed concrete, no-fines and brick house	Concrete
428	H. R. Hay— Request for comment on a proposal for steel and precast concrete construction	Concrete
430	A. W. Gardner— Request for information on concrete tiles	Concrete tiles
435	H. J. Dark— Request for information on pisé ..	Pisé
436	R. H. Halbert— Request for opinion on concrete construction by H. W. Horsell (Adelaide)	Concrete
437	A. E. Richards— Request for information on pisé and comment on sample of clay	Pisé
440	R. B. Patrick— Request for advice on brick-vencer construction	Brick
445	K. A. B. Watkins— General inquiry in regard to concrete bricks and tiles	Concrete tiles Concrete blocks
448	W. Rowney— General inquiry in regard to Denaro and other concrete blocks	Concrete blocks
451	M. O'Connor— General inquiry in regard to blocks and blockmaking machines	Concrete blocks
454	Secondary Industries Division— General inquiry in regard to Woodtex and Woodwool slabs	Woodwool
455	M. M. Johnson— Request for advice on relative merits of clay and concrete bricks and the value of the Truine brick-making machine	Concrete blocks
467	Buchan, Laird & Buchan— Advice re lightweight aggregates and foamed cement	Concrete
458	J. A. Ashforth— General inquiry on the use of concrete blocks and no-fines concrete	Concrete blocks
459	A. L. Palmer— General inquiry re concrete roofing tiles	Concrete tiles

Reference Number.	—	Classification of Inquiry.	Reference Number.	—	Classification of Inquiry.
461	J. A. Thompson— General inquiry re the manufacture of concrete blocks	Concrete bricks	517	Director of Works, Brisbane— Request for information on natural lighting with reference to the use of daylight factor protractions	Natural lighting
463	L. A. Hinks— Request for information on no-fines concrete	Concrete	519	South Aust. Portland Cement Co.— Request for reference on use of lime-cement concrete	Concrete
464	Department of Building Materials, New South Wales— Request for testing of specimen clay tile of Indian origin	Clay tile	521	P. E. Taber— Request for information on finishes for concrete floors	Flooring
466	Director of Works, Brisbane— Request for advice re Holodon ..	Orientation	47/03	Department of Public Works, New South Wales— A request was received from the Department of Public Works, New South Wales to inspect a number of houses on the Westmead Estate in which bricks were disintegrating seriously above and below the D.P.C. level. The matter was subsequently referred to B.M.R.	Bricks
468	Secondary Industries Division— Request for opinion of various Kwikform products	Building equipment	47/05	A. Schubert, Builder— Request was received to investigate the failure of a brickette lining to a fireplace	Bricks
468a	E. R. Carlson— Request for information on concrete blocks and comment on a design for a concrete flat roof	Concrete	47/06	L. Roubaud— Request for comment on a Swiss system of precast construction	Concrete
469	Skidmore, Owning & Merrill, Architects, New York— Request for information on prospects prefabrication in Australia	Prefabrication	47/07	Housing Division— Request to test concrete blocks (Jackson's Building blocks)	Concrete
471	Goliath Portland Cement Co. Ltd.— Inquiry re insulating and other characteristics of asbestos cement	Asbestos cement	47/80	Mack & Madden, Architects— Request for investigation of mortar in which unstaked lime had been used	Mortar
473	J. F. Nicholls— Inquiry re use of ashes as aggregate in no-fines concrete	Concrete			
476	Director of Works, Brisbane— Request for tests on coral aggregate to determine the best method of use in construction on Pacific Islands; samples being obtained for test	Concrete			
476	South Australian Housing Trust— Request for advice on use of lime-cement concrete for house foundations to reduce consumption of cement	Concrete			
476a	Irish Representative to Australia— Request for information on brick-on-edge construction	Brick			
477	J. J. Burrow— Request for comment on a type of concrete veneer construction	Concrete			
480	Danars Blocks Pty. Ltd.— Request for advice on steam curing	Concrete			
481	S. G. Robinson— Request for advice on precasting of concrete	Concrete			
483	R. A. Sharples— Request for information on insulation of skillion roofs	Insulation			
484	S. G. Alley— Inquiry re rendering on asbestos cement	Rendering			
485	Electrolytic Refining & Smelting Co.— Request for advice re changing construction of new works building from brick to no-fines concrete	General construction			
487	Telephone Rentals Ltd.— Inquiry re prospect of designing and producing aluminium roofing	Aluminium			
489	K. S. Wragge— Inquiry re concrete blocks and shrinkage	Concrete blocks			
504	Director of Works, Sydney— Request for advice and experimental work on the adhesion of rubber flooring to concrete surfaces. See paragraph 1.10	Rubber			
506	Building Inspector, Gunnedah— Request for advice re pressed metal roofing tiles	Roofing			
510	T. B. F. Garrett— Request for information on sand lime bricks	Bricks			
512	A. N. Ball— Request for comment on patent system of precast concrete slab construction	Concrete			
514	J. B. Wilson— Request for comment on proposal for steel and concrete construction	Concrete			
516	J. B. Hill— Request for general advice on pier construction	Pier			

The witness withdrew.

Walter Hayward Morris, Architect, of Peddle, Thorp, and Walker, practising architects, Sydney, sworn and examined.

297. *To the Chairman.*—I am aware that the Committee is inquiring into the proposal to erect a Council for Scientific and Industrial Research Administrative Building at Canberra. I was the architect responsible for the plans of the present Council for Scientific and Industrial Research buildings at Canberra. I have inspected the plans of the proposed building. I think the solution shown in these provisions is quite successful. The plan is different from what I remember of the sketch we got out about twenty years ago for the administrative block. I thought I had a copy but found that I have not. Anyway, I think the solution will work in very well with the existing buildings. It is of the same character and the finish is specified to be of the same type, with some slight addition of stone around the windows and the main entrance. The accommodation, I presume, is what is required by the Council for Scientific and Industrial Research, so I can make no comment on that. The external appearance is a good solution. I notice in the draft specifications that the main entrance and windows are to be framed in freestone. I suggest the coping round the parapet might also be freestone. It would add a little to the finish and is a more permanent material. The spacing of the windows at the sides of the building is shown in the same proportion as at the front and they appear to go very close to the internal corner. I can see the necessity to get as much light as possible, but from the perspective it seems that the windows are crammed up. The original plans provided for the connecting lavatory blocks to be of a lesser height than the central block.

228.—*To Mr. Condon.*—I do not think you can do much about internal lighting because of the floor area required and the square shape of the building. I do not think anything would be gained from the lighting point of view by bisecting the building with a passage.

To do so would be to split a large room. You would not gain any advantage on the other floor by bisecting it. The stairs would block the passage of light and you would lose room. The stairs are ample. There are stairs in the other buildings.

229. *To the Chairman.*—A damp course is usually attached to steel-frame windows to keep out rain. The cracking of the corners of the parapets of the existing buildings is caused by expansion and contraction of the concrete roof. You could attempt to insulate the roof, covering the insulation with a protective material, such as concrete. The parapet has been built on top of the slab and as the slab expands it is thrown out. I have no suggestions to make about the appearance of the building. It is quite satisfactory, so far as one can judge from a small-scale plan.

I cannot give you first-hand information about brick-laying, but I have been told that bricklayers are laying fewer bricks per day now than they used to lay.

You ask me whether I prefer day labour to contract building. It largely depends on the men working. If you can count on every one doing his job, obviously day labour saves a lot in forecasting what might

happen on a job. It gives you the actual cost as against estimated cost, assuming the work is carried out with the same efficiency as on a contract job.

We are still acutely short of houses. To be able to say that one building should take precedence over housing one would have to determine the importance of the building. This building is to be for scientific research, which is important to the country, and it may be claimed that it is as important as housing.

230. *To Senator Nash.*—You ask me whether I consider that the materials to be used in this building would greatly affect housing. Canberra has its own brick works. It depends on what it is producing. The rest of the material to be used would be mainly concrete and steel window frames. Not many steel window frames are used in houses, but they are in short supply. Some timber will also be used. If bricks are plentiful, the building should not interfere with housing.

231. *To Mr. Conelan.*—The estimated cost of £50,000 for the building is in keeping with present-day costs.

The witness withdrew.

1946-47-48.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

PARLIAMENTARY STANDING COMMITTEE
ON PUBLIC WORKS.

ADMINISTRATIVE BUILDING FOR THE ENTOMOLOGY AND
PLANT INDUSTRY DIVISIONS, COUNCIL FOR SCIENTIFIC
AND INDUSTRIAL RESEARCH, CANBERRA.

MINUTES OF EVIDENCE.

By Authority:

L. F. JOHNSTON, Commonwealth Government Printer, Canberra.
(Printed in Australia.)

EVIDENCE ON ENTOMOLOGY AND PLANT INDUSTRY ADMINISTRATIVE BUILDINGS, CANBERRA.

(Taken at Melbourne.)

SATURDAY, 22ND NOVEMBER, 1947.

Present:

Senator LAMR (Chairman).

Senator Nash. Mr. McLeod.
Senator O'Sullivan. Mr. Russell.
Mr. Conelan.

Dr. Arnold Edwin Victor Richardson, Chief Executive Officer of the Council for Scientific and Industrial Research, sworn and examined.

LIST OF WITNESSES.

	Paragraph in Evidence
Bayne, O. A., Assistant Director, Commonwealth Experimental Building Station, North Ryde, Sydney	.. 204-226
Dickson, B. T., Chief Executive Officer of the Council for Scientific and Industrial Research, Canberra	.. 88-115
Fleming, J., Chief Mechanical Engineer, Department of Works and Housing, Melbourne	.. 64-65
Isaacs, D. V., Director, Commonwealth Experimental Building Station, North Ryde, Sydney	.. 204-226
Jenkins, J. R., Secretary of the Australian Capital Territory Branch of the Building Workers Industrial Union, Canberra	.. 194-203
Limburg, D. E., Assistant Director of Works, Department of Works and Housing, Canberra	.. 145-166
Morris, W. H., Architect, of Peddle, Thorp and Walker, Sydney	.. 227-231
Nicholson, A. J., Chief of the Division of Economic Entomology of the Council for Scientific and Industrial Research, Canberra	.. 66-87
Oilphant, K. H., Architect, Canberra	.. 116-144
Phillips, H. W., Director of Architecture, Department of Works and Housing, Melbourne	.. 31-53
Richardson, A. E. V., Chief Executive Officer of the Council for Scientific and Industrial Research, Melbourne	1-30
Somes, F., Executive Officer of the Building Workers Industrial Union, Canberra	.. 167-193

1. To the Chairman.—I am aware that the Committee is inquiring into the proposal to erect an administrative building for the Council for Scientific and Industrial Research at Canberra. In my opening comment, I would paraphrase Churchill's famous comment on the Battle for Britain by saying that never in the history of the Council for Scientific and Industrial Research have so many people been so inconvenienced by lack of space for so long a time as have our colleagues at Canberra. I believe that the Committee will see at Canberra that there has been intense congestion in the Divisions of Plant Industry and Economic Entomology. In 1939, the Public Works Committee decided that there should be two laboratories in the block established at Canberra, with an administrative building between them. The buildings for the Divisions of Plant Industry and Entomology were erected, but then there was a depression and the project for the construction of the central block remained in the air.

In order to indicate the requirements of the Council for Scientific and Industrial Research, I refer the Committee to the growth of its various staffs at Canberra. In 1930-31, there were 34 research officers and technical officers at Canberra and nineteen other personnel, a total of 53. In 1938-39, there were 57 research officers and technical officers and 71 other personnel, a total of 128. In 1947-48 there are 88 research officers and technical officers, to which number will be added twelve more. Approval has been given for the additional twelve appointments, and the vacancies are being advertised. This will bring the number of research officers and technical officers up to 100. There are 128 other personnel, making a grand total of 228. Therefore, the buildings erected in 1929 to provide for 53 officers, are now required to provide accommodation for 228 officers.

There has been a corresponding development at other stations, as I shall show. In 1930-31, the Council for Scientific and Industrial Research Canberra Divisions had only six officers outside of Canberra. By 1938-39, that number had increased to 21. The total now is 128. These officers are stationed at various places from Katherine and Ord River in the north down to Tasmania, and from the Burdekin River across to the south-west of Western Australia. We have stations in every State. The two divisions—Plant Industry and Entomology—now have staffs totalling 226, as compared with only 53 in 1929.

We soon found, even during the depression, that there was justification for erecting the central building that was originally planned, but it was very difficult, in view of the grave financial conditions, to secure

approval even for current expenditure, much less capital expenditure. However, we did persuade the Government of the time to consider a plan for the erection of a portion of the front of the proposed building in order to provide much-needed accommodation. In 1938-39, tenders were called for, but then the international situation was very grave and the Treasurer at that time, Mr. R. G. Casey, directed the deferment of the scheme notwithstanding the seriousness of our position.

In 1946, we directed the attention of Mr. Deakin to our requirements. We submitted a memorandum in August of that year recommending the construction of a central block to provide 23,250 square feet of floor space. We pointed out that this was needed for the administrative offices of the two divisions located at Canberra, for expansion in the records and clerical staffs, for the library, and particularly for special controlled-temperature laboratories. The estimated cost of the building required was then £60,000, and provision was made in the estimates last year for that expenditure. The Minister approved of that on the 30th August, 1946, subject to giving final approval when tenders had been called and prior to signing any contract. In other words, he gave us authority to proceed with the construction of a building to cost £60,000 after having made a very careful investigation of the details.

At this stage, I submit to the Committee a document prepared by Dr. B. T. Dickson, Chief of the Division of Plant Industry, and Dr. A. J. Nicholson, Chief of the Division of Economic Entomology, and submitted by them to the executive of the Council for Scientific and Industrial Research. It is as follows:—

1. PLANT INDUSTRY AND ECONOMIC ENTOMOLOGY, JOINTLY.

(a) Existing laboratory space is inadequate for present needs, being overcrowded by both staffs and equipment. The middle block, when erected, will make possible the freeing of laboratories at present occupied by the library and clerical staff in the existing buildings, and will provide some additional laboratory space.

The two sections on the plan coloured grey were intended to be laboratories. They are fitted with benches and provided with water, gas and electric light for the purposes of chemical and entomological work. Unfortunately we have to use those parts of the buildings for the library and for clerical work so that the equipment is wasted. We have tried to overcome this handicap to some degree by putting some of the staff in temporary buildings, but these can only be regarded as temporary. The report continues:—

(b) Existing accommodation for the present clerical staff and records is most inadequate. To provide sufficient working space for the staff, we have had to house approximately half of our records away from the main office, the greater part in a small cubicle about 100 yards away from the building, and the remainder in the store, also situated away from the main buildings. This arrangement is most unsatisfactory, particularly so in wet weather, and in the winter months. Again, without considering possible increases in our clerical staff, we really need more typists immediately, but we have nowhere to put them. Because of the shortage of typists, we often find it difficult to get results of experiments typed, and correspondence answered, within a reasonable time.

(c) The library, at present accommodated in several laboratory rooms, is little more than a book stack, and even so, difficulty is being experienced in finding space for new accessions. More space must be provided in the immediate future for more book storage, and there is no reading room, nor adequate working space for the librarian.

(e) It will be noted that the middle block is required in order to meet our urgent needs for the present and immediate future. Even with it, there will be inadequacy for the future. Canberra divisions in post-war years if their staff is to be expanded as appears necessary in order to cope with the work they will have to do. Naturally, the space provided in the plans for the library and the office staff is designed to be adequate for a period of ten to twenty years, but any space not immediately required for these purposes will certainly be required by the scientific staff until such time as additional space is provided.

2. PLANT INDUSTRY.

In the immediate future it is estimated that with the return of officers from other service, whose release we are seeking, and the appointment of new personnel necessary for the work in progress and planned, the division will have to find room for about a dozen officers. The building which has been used in part available in the building used for meetings, and which I regard as vital to the Staff. The construction of the middle building, where the present laboratory block to the extension of three laboratory rooms, which, with the above-mentioned common room, would provide for a total of about 150 rooms which could

3. ECONOMIC ENTOMOLOGY.

will be needed in the immediate post-war period.

For a long time, and particularly during the war years, our work has been greatly hampered by lack of controlled-temperature rooms. We would be very short-tempered if we did not take the opportunity of your purpose, for basement in the middle block to be maintained with particular controlled temperature conditions.

As the middle block were not to be built, case has been made for the basement to be built, and it would be necessary to ask for a special building order to allow the work to be done. In the basement, and in a controlled temperature work to be done in the basement, for an additional year, I propose to ask for a special building order to allow the work to be done. In the basement, and in a controlled temperature work to be done in the basement, for an additional year, I propose to ask for a special building order to allow the work to be done.

In the plans for the basement, rooms for the following purposes are provided:—

Enthusiasm.—[S]

In the plans for the basement, rooms for the following purposes are provided:—

There are many thousands of species of these pests in Australia, and in order to get an understanding of their life history it is necessary to cultivate them under conditions of controlled temperature and humidity. Some, like the buffalo fly and the tick, require high temperatures. Other require low temperatures. Some need high humidity and others need low humidity.

2. To Mr. Condon.—From the studies that we have made of the buffalo-fly under improved conditions, we are convinced that it could come down to there. It is Coff's Harbour. It could either the pest could spread inland, where temperatures are higher but where the conditions are not so humid as on the coast. From our preliminary studies, it seems that the buffalo fly needs a combination of fairly high temperature and high humidity. I think the probabilities are that the pest will spread through the coastal areas in preference to inland districts.

(b) *Maintenance of Insect Cultures.*—Four rooms are planned all of which can be heated, while one can, if necessary, be cooled somewhat below the ambient temperature. These are required for the mass-breeding of insects required in our experiments, e.g., with insecticides, and the mass-breeding of parasites.

The Government did not put up the whole of the buildings at Canberra; the Empire Marketing Board contributed part of the cost. One of the levers that we used to have the buildings erected was the fact that the Board had offered to contribute about £10,000 for capital expenditure.

4. *To Mr. McLeod.*—That treatment does not affect the roots and other things. It affects grass only. St. John's wort is very intolerant of salt.

temporarily. St. John's wort is very intolerant of salt.

5. To the Chairman.—The Council for Scientific and Industrial Research was pressed to do something about St. John's wort and it sent a man named Wilson to the south of France. He later did a lot of work during the war in keeping weeds out of wheat. His task was to try to find a parasite which would affect St. John's wort. He succeeded in 1933-34. We were very disappointed with the results at first. Then, in 1939-40, we began to see the parasites liberated seven or eight years previously were becoming established and having a wonderful effect. In the Bright district now, the value of every piece of land formerly affected by St. John's wort has increased by £3 or £4 an acre as the result of the introduction of these parasites. That is tribute to their value.

Dr. Tillyard discovered a parasite *Aphelinus Mali* that the Burley Gardens authorities liberate in apple trees to kill the woolly aphids. It is a sort of lady-bird. Numbers of other successful parasites have been developed in Australia.

Probably the outstanding case in the world for all time is that of the *cactoblastis* parasite. It was introduced to Australia from Uruguay and settled the menace of the prickly pear, which covered an area of 60,000,000 acres in 1926 and was spreading at the rate

The Commonwealth should have asked the Queensland Government to pay the Council for Scientific and Industrial Research a rental of 1s. an acre on the land that was liberated from prickly pear. That would have given us an income of £3,000,000 a year.

We are importing parasites from other parts of the world to attack pests in the same way as prickly pear and St. John's wort, but we cannot be successful every time. For instance, we tried to find a parasite that would handle blowfly, but we discovered that the blowfly was able to multiply so rapidly that no pest which we could produce could keep pace with it. Therefore, we cannot hope to eliminate the blowfly in that way.

In order to accustom parasites which we introduce from other countries to the changed seasonal conditions, we have to put them in controlled temperatures and humidities for a period of about six months.

6. To Mr. Conelan,—"Paterson's curse is a very bad pest. It is an annual, and there is not much hope of killing an annual weed with a parasite. Suppose that we import a parasite which attacks an annual weed. It might destroy all but 1 per cent. and then die because there was no further food supply. In a few years time, the 1 per cent. of the weed not destroyed would breed up again." Of course, there is a first rate chance of destroying a perennial weed, which does not die back for six months in every year.

7. To Mr. McLeod.—Our difficulty is to find space for the cultivation of the many species of parasites with which we experiment. People only hear of a few of our successes. In order to discover the effectiveness of the *cactoblastis*, we had to continue investigations for years and years. An expedition was sent to South America and various parasites were tested in Queensland over a period of years before we discovered the one capable of killing the pest and which would not attack other crops.

8. **To the Chairman.**—We are doing our best to make information about our activities known to the public. Scientists are notoriously modest, but we publish the information in bulletins and in our own journal, and we do so receive a great volume of publicity in the press. Of course, reading the capital city newspapers, one might imagine that the Council for Scientific and Industrial Research does nothing apart from conducting chain-making experiments and sending radio messages to the moon. However, country newspapers publish the result of our experiments in considerable detail. The city newspapers want their space for other things than results of scientific research.

9. *To Mr. Conelan.*—Prickly pear has very little value. Naturally, the most sensible use for it would have been as cattle fodder. Actually, investigations on those lines have been made both here and in America. The spines have to be singed off the prickly pear because otherwise they get into the tongues of the animals. The result is only a low-grade cattle food.

10. To Senator O'Sullivan.—The cost of singing is too great to make the process worth-while. The scheme has been abandoned for that reason. Prickly pear is used as cattle fodder in South Africa, but there is plenty of cheap labour in that country. I would sooner get rid of prickly pear entirely with cactoblasts than attempt to use it. So long as it occupies land, that

land is unproductive. When it is eradicated, really good pastures can be grown in its place. The fact that the land where it became established grew prickly pear to a height of eight or ten feet indicates the quality of the soil there.

11. To the Chairman.—Another point mentioned in the submission on behalf of the Division of Economic Entomology is that four rooms are needed for seed storage, for incubation experiments with seeds. That is very important. It can be readily understood that, in order to make place like Canberra, arrangements should be made to carry out germination tests and so forth at temperatures above normal room temperature. However, temperatures below normal room temperature cannot be produced by such means of artificial cooling. A set of rooms is needed to experiment with seeds at all temperatures between zero and 100 degrees F. There is no provision for such work at present.

The submissions conclude with the following general paragraph:—

Approval for the erection of the middle block was obtained from the Public Works Committee in 1923. Successive recommendations for its erection have not complied with, purely for reasons of economy, and never because of doubt of the needs of the Canners divisions. With the lapse of time, the situation has become desperate, and work has, for some time, been seriously hampered owing to lack of adequate and suitable accommodation to meet present needs.

We have given much thought to the question of the essential requirements of the Divisions of Economic Entomology and Plant Industry, and in consultation with us, the Government Architect has now prepared plans which, in our opinion, will be a proof of our immediate needs.

We therefore recommend an immediate approach to Treasury asking that the Works Department be given authority to anticipate approval of the estimates for the middle block so that this construction may be undertaken without loss of time.

That memorandum sets out our case. It was on that that we submitted the requisition for the building to Mr. Dedman in 1946. He gave his approval on the 20th August, 1946, on the understanding that the recommended tender would be submitted to him for approval before the contract was signed.

Our experience is that there has been a fairly substantial increase of the cost of buildings during the last twelve months. There is scarcely a building which has not cost more than we thought it would cost in 1945-46. A building that would have cost £80,000 last year is now estimated to cost £70,000. That is the proposal before the Committee.

Certain activities of the Council for Scientific and Industrial Research in the various States cannot be transferred to Canberra. We shall arrange a conference with the Australian Meat Board soon regarding research in the beef cattle industry, one of the great industries of Australia. There may be better prospects for long term improvement of that industry than any other primary industry because meat, particularly beef, is in demand in increasing quantities.

We plan to send officers of the Council for Scientific and Industrial Research to all centres where problems are to be tackled. We have a group working in the Burdick Valley. These men found, after a preliminary survey, that a dam 100 feet high across the Burdick River 99 miles from its mouth would hold back 2,000,000 acre-feet of water, a greater quantity than could be retained by the Hume Reservoir when then completed. If the dam were raised to 120 feet, it would command 5,000,000 acre-feet of water, which would be equal to the total capacity of all Victorian water storages.

12. To Senator O'Sullivan.—This might also help to save the flooding of the Burdekin River each year. I could not be sure about this, because there is a technical factor governing that flooding. There is a large area of

land in the Burdekin Valley and the question to be answered is: How should the water be used if a dam is constructed? Sugar cane does not provide the answer. On present prospects, sugar cane-growing would be too risky. I consider that it would be a mistake to grow sugar cane for export purposes. Tropical fruits would not provide a *satisfactory* answer. The market for tropical fruits is almost saturated now.

There is one thing that we can grow and ought to grow, namely pastures for the fattening of beef cattle so that we can market in Great Britain first-class chilled beef like Argentine beef, instead of the frozen beef that we now export. However, nobody has yet proved that an irrigated pasture capable of fattening cattle can be grown in North Queensland. Until that is demonstrated, it would be decidedly risky to proceed with the construction of a dam across the Burdekin River. We have made an arrangement with the Queensland Government, through the Prime Minister and the Premier, for a thorough engineering survey of the Burdekin Valley in order to ascertain whether the results of our preliminary investigations are accurate. If they are accurate, it is clear that we can construct a gigantic water storage at low cost.

In the meantime, the Council for Scientific and Industrial Research, in conjunction with the Queensland Department of Agriculture, will conduct experiments to establish whether the 500,000 acres of land which we believe could be irrigated from such a water storage is capable of growing pastures suitable for fattening cattle. We estimate that this is a five-year job. We have already started work at Ayr, which is on the delta of the Burdekin River and where there is an established farm which was conducted by the Department of Agriculture to produce vegetables for the troops. That has been handed over by the Queensland Government, and we, in association with that government, will make a soil survey of the area to make sure that the soils are satisfactory.

We then plan to grow experimental pastures, which we will irrigate. Finally, we will bring cattle on to the pastures in order to ascertain whether they can be fattened. Our share of the investigation will cost probably £5,000 a year, but the stakes are high.

One of the difficulties experienced in Queensland is that the growing season lasts for about four months and the dry season for about eight months. It should be a remarkably productive area under irrigation during the winter months, when temperatures are high. I believe that the prospects are very good.

Another centre where the Council for Scientific and Industrial Research is working is Katherine, where we have taken over the army farm. Our survey has shown that the only area in the Darwin-Katherine region of 20,000 square miles which is worth while developing for agricultural purposes is one of 500,000 acres of red soil with limestone underneath. These soils are marginal in regard to rainfall and soil fertility, but they are cultivable and perhaps they can be made productive by the use of modern scientific methods.

Before any attempt is made to settle the area, I think that some organization like the Council for Scientific and Industrial Research should thoroughly investigate its potentialities. We should establish what kind of crops can be grown there and how the land can be used to the best advantage. The old system of trial and error was practiced throughout the first 100 years of Australia's history. We should not attempt to develop the Northern Territory and other remote areas until we have the basic scientific facts before us. This would be a new and intelligent approach to the problem of developing our country.

Preliminary reports on the Barkly Tablelands are available. We have one covering the Darwin-Katherine region, which will be printed without maps.

13. To Mr. Russell.—In the light of present knowledge, I doubt whether it is feasible to bring about any material increase of the productivity of country adjacent to the east-west railway line. The rainfall is too light for the production of crops. There is no water for irrigation that we know about, although supplies may be discovered in future. I consider that the only prospect of improvement lies in the introduction of better types of grazing and management. I think that it would be possible to increase productivity materially by these means. However, we have not tackled country with such a light rainfall as that up to the present.

14. To Mr. Conelan.—The question as to whether the supply of artesian water is diminishing is of great importance. The evidence is that there has been a reduction of the rate at which individual bores flow. However, I do not think that there has been any evidence that the supply of artesian water as a whole has been depleted. The balance of evidence favours the fact that the supply is not falling off.

The Burdekin River scheme which I have mentioned is not similar to the Bradfield scheme. The Burdekin flows to the Pacific. The Darling and the Murray are the only two rivers which flow through the dry areas of Australia. It would be very difficult to distribute water from the Burdekin Valley to other States for irrigation purposes because it is on the coastal slope of the dividing range. The Bradfield scheme proposes to take water from the Burdekin River over the dividing range or through a tunnel. The proposal which we have in mind envisages a stupendous volume of water being conserved by a comparatively small dam.

The construction of this dam might also lead to the production of hydro-electric power. Those details have yet to be worked out. This is a good type of planning. The State is making an inventory of its resources, and the Council for Scientific and Industrial Research is experimenting to find out how those resources can be used to the best advantage.

15. To the Chairman.—The relations of the Council for Scientific and Industrial Research with the State governments are of a most cordial character. Under the Commonwealth Constitution, the six States retain sovereign powers in respect of agriculture. When the Council for Scientific and Industrial Research was established in 1927, we asked the State Departments of Agriculture to discuss whether there was a place for the research. Their answer was, in effect, "Most decidedly, yes." The Commonwealth, through the Council for Scientific and Industrial Research, is interested in all agricultural problems which are of common interest to two or more States. For instance, it is interested in New South Wales and Queensland, and in buffalo fly and blowfly, which affect a number of States. Each State handles problems which affect only itself.

Co-ordination is effected through the Australian Agricultural Council. The Commonwealth is represented on the Council by the Minister for Commerce and Agriculture and representatives of Commonwealth departments. In practice, the council consists of ministerial representatives of the Commonwealth and of the States, and it is advised by the Standing Committee on Agriculture, which the Council for Scientific and Industrial Research had created in 1927. It consists of the appropriate Commonwealth and State Ministers and permanent departmental heads. The Council for Scientific and Industrial Research submits its plans to that committee, which arrives at conclusions for submission to the council.

Many divisions of the Council for Scientific and Industrial Research are established in State institutions. For example, we have the Division of Radio-Physics, the National Standards Laboratory, the Division of Physics, and the Division of Electro-Technology in the grounds of the University of Sydney. We also have the Division of Animal Nutrition in the grounds of the University of Adelaide. We are erecting a building on land which the University of Melbourne is making available to the Council for Scientific and Industrial Research. In that instance, we have an arrangement with the university, which I think will always be honoured, under which the building will be available to the Commonwealth for as long as we wish to conduct research work there.

16. To Mr. Conelan.—An agreement to that effect has been made with the university authorities although no lease has been signed or considered necessary.

17. To Senator O'Sullivan.—Research into the sugar industry is an activity of the Queensland Department of Agriculture. Officers of the Council for Scientific and Industrial Research are not engaged on that work. A very interesting arrangement has been made between the Government of Queensland and the Commonwealth. The State Government has asked the Council for Scientific and Industrial Research to occupy a part of that very noble building that has been established at Saint Lucia for the University of Queensland, and early in the New Year we shall take over about 4,000 or 5,000 square feet of space in the main building as well as part of the chemical laboratory. When the bridge over the river is built and the University of Queensland wants to occupy those buildings at Saint Lucia, it will erect a laboratory building satisfactory to the Council for Scientific and Industrial Research, in the grounds of the university, but will not ask it to move its officers from the buildings at Saint Lucia until the laboratory is ready for occupation.

18. To the Chairman.—With regard to Empire and international problems, the Council for Scientific and Industrial Research has a number of co-operative arrangements with Empire countries. Each constituent part of the Empire finances its own activities. In 1927, twelve Imperial agricultural bureaux were established for the purpose of carrying on agricultural research. The finance for these organizations is provided by the dominions and crown colonies of the British Empire, including Ireland. They have a joint staff and they are controlled by an executive council representative of every member nation of the British Empire. The Government of the United Kingdom contributes to the expenses of these bureaux. They disseminate information regarding twelve branches of agricultural science.

For instance, there is a Bureau of Pastures, which summarizes all results of scientific work done in every country, including Soviet Russia, and distributes the information to the member governments, which pass it on to those who are interested. It is a marvellous example of Empire collaboration. The grant for these bureaux has just been renewed for a period of five years.

The Council for Scientific and Industrial Research is not now connected with the Fuel Research Laboratory at Greenwich, which deals with the production of oil from coal. At the outset of the operations of the Council for Scientific and Industrial Research, in 1926, we thought that research into the production of oil from coal was rather important, and we sent two men abroad for study. One of them is Mr. Rogers, who is now associated with the Glen Davis project as advisor and consultant. He also acts as advisor to the Department of Supply and Shipping. Then the Council for

Scientific and Industrial Research found that its resources were rather meagre and that the problems of the country were diversified, and it came to the conclusion that it should concentrate on primary production. Therefore, from 1926 until 1935, it did nothing in the field of secondary industry. It developed activities in connection with plant industry, entomology, animal health and animal nutrition, forest products, fisheries and food preservation.

We took the view that the problems of agriculture were of overwhelming importance. Buffalo fly was causing great losses, blowfly was estimated to cost the country £4,000,000 a year, St. John's wort and other pests were rampant, and there was pressure from the primary producing sections of the community for assistance. Therefore, we devoted our limited resources to agricultural work.

Buffalo fly has been with us for a long time. I believe that it came to Australia with buffaloes from Java. For a long time it was more or less confined to the Northern Territory and in the early years of the Council for Scientific and Industrial Research, following the successes achieved with *cactoblastis* and other parasites, we thought that we might find a parasite capable of dealing with the buffalo fly. We brought a world authority in this field to Australia from the University of Geneva. He spent many years here and also visited Java, but the net result of his work was that we could not find a parasite which would seriously reduce the buffalo fly pest.

The only way in which we could control it was by spraying and dipping before the cattle were transported to the eastern States. A few years ago, during the war, the system of inspection in Queensland became a little lax and finally the buffalo fly reached the Atherton Tableland and then the east coast. There it began to develop with amazing results and it spread southwards rapidly.

At this stage, about three or four years ago, we established a little station on the Atherton Tableland. We had two ideas in mind. One was to try the effectiveness of trapping the insect, which had attacked dairy herds whereas previously it had affected only beef cattle. Little work could be done against the pest in the beef cattle industry, in which the animals are rounded up only once a year. Dairy herds are handled twice a day, and something can be done about the pest under those conditions.

At the Atherton Tableland station we tried a method of trapping based on the American horn fly trap. The horn fly is closely related to the buffalo fly. The trap was successful. As the animals went into the baits they had to pass through an opening, and as they did so brushes swept the flies from their hides. A glass and a light were fixed above them so that the flies flew to the light and were trapped. We killed them by thousands twice a day. As many as 5,000 flies were caught from one animal. This system reduced the numbers of the pests considerably but did not provide a complete solution.

At that time, DDT was being used for typhus all over the world. We decided to examine the effect of DDT on the buffalo fly and, from our tests, we are optimistic about controlling the pest now. The dairying industry need not worry much about it because, if the animals are sprayed occasionally with DDT on the shoulders, the buffalo fly is killed. The pest has a peculiar characteristic in that it cannot live longer than 24 hours without being on its host. It is not necessary to spray an animal all over. Spraying on the shoulders is sufficient. If a buffalo fly touches a little DDT, it dies. Spraying is found to be completely effective.

19. *To Senator O'Sullivan.*—The buffalo fly does not irritate the beasts to the same extent as cattle ticks. It is quite different from tick, of course. DDT is very effective for curing cattle tick as well.

20. *To the Chairman.*—The account of our experiments in the fight against sheep blowfly is a long story. The method of attack now is prevention based on a discovery made by a practical farmer in South Australia. This man discovered that the parts affected by the sheep blowfly are the breech, and that by cutting the wrinkles out of merino sheep when the lambs are young, the urine is prevented from getting on the wool and causing decomposition, which leads blowflies to lay their eggs there. This contribution was not sufficient to enable the pest to be controlled. Other factors had to be worked out. However, we are now satisfied that the blowfly can be completely controlled by a modification of the original operation, leaving the tail about 6 inches long and cutting the breech wrinkles out in the early stages. This affords reasonable protection to the animals.

At the moment, I cannot foresee the administrative head-quarters of the Council for Scientific and Industrial Research being transferred to Canberra. A building almost as big as the Canberra undertaking is being erected at Albert-street now. The secondary industry problems to be dealt with by the Council for Scientific and Industrial Research are very important, and, in handling them, great advantages can be derived from being established close to the places where they exist.

The staff at Canberra is already housed. The chief trouble is that there is not sufficient accommodation in the Council for Scientific and Industrial Research buildings. Most members of the staff are provided with houses. Only a few recently appointed members live at hostels.

We have a very extensive system of exchange of publications with other institutions throughout the world. Practically all of our publications are sent to every university of note in the British Empire and to the major institutions in foreign countries. In return we receive whatever publications those institutions produce. The various Royal Societies and other scientific bodies particularly exchange literature with us. That saves the Council for Scientific and Industrial Research the expenditure of a great deal of money in contributions.

The provision for library accommodation at Canberra will be adequate when the proposed building is completed. Libraries extend very quickly and what might be adequate provision to-day might be inadequate in ten years time. However, fairly reasonable provision has been made in the plans for the library. It will be situated on the top floor of the building. Old records can always be removed and stored elsewhere if they accumulate in excessive quantities.

Bitter pit in apples is no longer a pest. That problem was solved by an officer now with the Department of Commerce and Agriculture.

In 1935, blue mould in tobacco was a serious pest. It was the limiting factor in the production of tobacco in Australia. It caused difficulty in raising tobacco in the seed beds. At that time, the growers and the Government were considering two proposals. One was to raise the seedlings in New Zealand and fly them to Australia, and the other was to raise them at Alcoa Springs and then bring them to Victoria or New South Wales. Then Dr. Angell found a method of treating the pest in the seed beds. He found that the use of benzol vapour at night completely inhibited the growth of blue mould. This meant that, if growers constructed concrete beds and used benzol vapour there while raising the seedlings, they would not suffer from blue mould.

It is sometimes said that it is very difficult to disseminate agricultural information. Farmers are said to be very conservative and slow to act. That was not so in the case of the tobacco-farmers. I inspected the tobacco-growing areas in 1937 and I found that, of the 600 growers in the north-east of Victoria, not one had failed to adopt the benzol vapour treatment, the discovery of which had been made only a couple of years previously. When a discovery of this sort touches the farmers' pockets, they very quickly assimilate the information. The control of blue mould has been very successful, and now we can enter on the production of tobacco with every confidence, knowing that we shall never experience such a débâcle as we had years ago, when whole crops were wiped out.

21. *To Mr. McLeod.*—Dr. Angell carried out his research work at Canberra. His discovery created a great deal of interest.

22. *To Senator Nash.*—Provision is made in the plans for a room which can be used for lectures and staff discussions. I am afraid that similar accommodation which will be provided in the big secretariat proposed to be erected at Canberra would not satisfy our requirements. That secretariat will be a long distance from the Council for Scientific and Industrial Research buildings. Staff meetings are held at the Council for Scientific and Industrial Research probably two or three times each week. The room provided for in the plans will not be very large and it will be used not only as a lecture room, but also as a common room, where meals can be eaten and so forth. It will take up only a small part of the total area.

Apart from essential toilet facilities there is no provision in the plan for staff amenities. There will be no canteen in the building. The entire space in the basement will be used for the important controlled-temperature insect rooms. The floor above will be used for accounts and records, and the next floor for the Chiefs of Divisions and their technical secretaries and for the common room. The top floor will be used exclusively for the library and book stacks.

The nearest eating houses to the building will be at Civic Centre, about a mile away. The bus route will serve the proposed building. I do not think that the staff will be badly placed from that point of view. The shops at Civic Centre and some of the hostels will be reasonably accessible.

23. *To Mr. McLeod.*—Present accommodation at Canberra is about the same as it was in 1920, although the staff has increased from 69 to 356. It is a fact that some of the rooms used for office purposes contain equipment for experiments. There is no alternative. We have been obliged to increase the staff in order to cope with an increased volume of work, but we cannot provide sufficient working space.

For the initial stages of any experiment, it would be advisable to have the scientific staffs centralized at Canberra. In the field of entomology and plant industry, we could concentrate most of the scientific work at Canberra. We are doing so now as much as possible. Of course, there is no provision at Canberra for animal health work. For that purpose we have the McMaster Laboratory in Sydney and another one in Melbourne. Our headquarters for animal nutrition work is at the University of Adelaide. We are also working at the Waite Institute at Adelaide.

Any information that is brought to light by the work of the Council for Scientific and Industrial Research is passed on to farmers through the State Departments of Agriculture. We regard the States as the proper agencies for the dissemination of information. The States provide experimental stations and other facilities for us when we wish to carry out practical work.

They have been very helpful to us in that respect. We make use of State institutions to a very considerable degree in Queensland, New South Wales and South Australia. Our urgent need at the moment is accommodation adequate for the purposes of our work.

24. *To Mr. Russell.*—The Council for Scientific and Industrial Research could use probably eight more typists on its staff at Canberra if it could attract them to its service. We could also use more typists in our head office. Unfortunately, we have difficulty in competing with industry, in which girls are paid better salaries.

I could not estimate the probable increase of staff over the period of the next ten years. In my opinion, there will be a considerable increase. I should be surprised if the size of the staff is not doubled within ten years.

We had 3,488 employees in 1940-47 and this year we have 2,789. That represents an increase of 124 per cent. per annum. Of course, that rate may not be maintained.

There is a tremendous volume of work yet to be done by the Council for Scientific and Industrial Research. We are just entering on coal research under direction from the Government. Later we shall go on to investigate the production of oil from coal and brown coal. The equipment and the staff necessary for that work will be very considerable. I can only make a wild guess at the moment at our requirements for those purposes.

I believe that the proposed building will still be large enough to satisfy our needs ten years hence. We propose to erect another building for pasture research.

I am not sure whether the weevil in wheat germinates in the grain or penetrates the grain afterwards. I believe that the insect lays its eggs in the grain and that the eggs hatch when moisture and heat conditions are satisfactory. As the insect grows it eats the flour.

25. *To the Chairman.*—I believe that the administrative quarters will be adequate for an indefinite period. We do not anticipate increased requirements in that building. However, even if the proposed building which the committee is now considering is erected, we still will not have sufficient laboratory accommodation, particularly in the field of pasture research.

I have not been closely associated with the work on water blister in pineapples. Dr. Dickson has some knowledge of that.

26. *To Senator O'Sullivan.*—Cotton-growing in Queensland does not come under the purview of the Council for Scientific and Industrial Research; that is a State matter, because cotton is grown only in Queensland. If it were grown in more than one State, the Council for Scientific and Industrial Research would certainly be interested. We are trying to grow it at Ord River and at Katherine, and we believe that it can be produced satisfactorily at both places. Whether it can be produced economically is another matter. I do not think that cotton-growing will ever become a big industry in Australia until we solve the problem of harvesting it by mechanical means.

27. *To the Chairman.*—The situation in relation to rust in wheat is very interesting. Professor Waterhouse, of the University of Sydney, is a worker of outstanding capacity in this field. He is the recognized Australian authority and is one of the world authorities on rust. We need to think that rust was a simple matter and that all rust was alike. Professor Waterhouse has shown that there are biologic strains or varieties of rust. It is just like wheat in that respect. There are varieties of wheat which are resistant to one or other of the varieties of rust, but in order to be successful we must produce a wheat that is resistant to

all varieties of rust. Professor Waterhouse has shown that there are about nine different strains of rust. In order to get a truly rust-resistant wheat, we must breed a strain that is immune to the nine strains of rust. Professor Waterhouse has shown that, by cross-breeding certain types of wheat which are resistant to three or four strains of rust with another strain of wheat that is resistant to another three or four strains of rust, and crossing the result with a third variety that is resistant to the balance of the strains of rust, it is possible to obtain, with absolutely scientific accuracy, a variety of wheat which is immune to all varieties of rust. He has actually achieved that result in north-western New South Wales.

28. *To Mr. Conelan.*—Some rusts are more damaging than others. I do not regard the rust problem in Australia as very serious, because the climate of the wheat belt is normally dry as the wheat matures.

29. *To Mr. Russell.*—The rust problem in South Australia is bad this year. When there is humid weather in October and November there is likely to be a great outbreak of rust. However, a season like the present one is unusual.

30. *To Mr. McLeod.*—The use of DDT to attack the sheep tick has not been experimented with extensively yet. We have concentrated on cattle tick.

The witness withdrew.

(Taken at Melbourne.)

MONDAY, 24th NOVEMBER, 1947.

PRESENT:

Senator Nash.	Senator LAMR (Chairman).
Mr. Conelan.	Mr. McLeod.
	Mr. Russell.

Hampden Wendell Phillips, Director of Agriculture, Department of Works and Housing, sworn and examined.

31. *To the Chairman.*—I am aware that the committee is inquiring into the proposal to erect a Divisional administrative building for the Council for Scientific and Industrial Research at Canberra. I have prepared a statement on the subject as follows:—

The proposed building will be situated between the laboratory buildings of the Division of Entomology and Plant Industry and will be used broadly for laboratory, administration and library purposes for these divisions.

This is not actually a new project, as a design for this central block was prepared by the Federal Capital Commission as a part of a scheme which included the laboratories of the two divisions. These laboratories were later erected, whilst the building of the central portion was postponed to a later date.

In January, 1945, the Council for Scientific and Industrial Research again drew attention to the urgent necessity for the erection of the building and requested the preparation of sketch plans. These have since been prepared in consultation with the officers of the Council.

The following is a brief description of the proposed building and the site.

The site is in the area at Canberra set aside for the Council for Scientific and Industrial Research and comprises the space between the Entomology Laboratory and the Plant Industry Laboratory. Space in the proposed building will be used for scientific research and administrative functions associated with the Divisions of Entomology and Plant Industry. At present these activities are carried on in most unsatisfactory conditions in the two existing buildings which have become severely overcrowded. The erection of the proposed building will relieve this congestion and allow rooms designed as laboratories to be released for their specific purpose.

The relevant drawings are available for examination and consist of—A site plan, floor plans, and front elevation.

The overall dimensions of the building will be 74 ft. 4 in. by 89 ft. 7 in. There will be a lower ground floor, ground, first and second floors, having an overall floor space of 25,658 square feet subdivided as follows:—Scientific activity, 15,098

square feet equals 68 per cent.; clerical, 4,513 square feet equals 20 per cent.; services, 4,506 square feet equals 22 per cent.

32. *To Mr. Connelan.*—"Services" means lavatories, hall, corridors, and other necessities to the premises.

33. *To the Chairman.*—"The statement continues.—The lower ground floor will be used to accommodate boilers, ventilation machinery, preparation and apparatus, seed testing, incubation, plant propagation, cool rooms, constant temperature rooms and furniture storage.

The ground floor is to be occupied by the senior clerical and officer, typists, accounts, records, clerical stores and the entrance hall.

On the first floor will be the chief scientific officers of the two divisions, the technical secretaries, a conference room, biometrical, assistant biometrical, photographers, computers, histology, and a common room.

The whole of the second floor will be taken up by the reference library and will comprise a reading room, librarian's office, stock room and workroom.

The proposed building has been planned in accordance with modern practice and will harmonize with the existing laboratory buildings with which it is linked up.

The structure will have reinforced concrete frame with external brick bearing walls. The stairs situated in the centre of the building will be of reinforced concrete.

The external walls will be cement rendered to match existing laboratory buildings. The main entrance and trim to windows will be of free stone.

Partition walls will be of terra cotta lumber to door head height with timber and glass above.

The entrance hall, foyer and staircase will be panelled with selected Australian timbers.

Internal Wall Finishes.—Plaster throughout except to hall, foyer and staircase where wood panelling is provided.

Floor finishes.—Wood block, wax polished.
Entrance hall.—Wood block, wax polished.
Constant temperature rooms and lower ground floor.—Granolithic.

Offices and corridors, library, &c.—Heavy linoleum with canvas underlay.

Ceilings.—
Typists rooms, conference room, common room, and common room.—Acoustic material.
Foyer and second floor ceilings.—Fibrous plaster.

All other ceilings.—Plaster.
Although these will be fully described by the Chief Mechanical Engineer, the following brief outline is given as indicative of the general services and conditions planned for.

Plant.—Boiler rooms and mechanical ventilating plant are located on lower ground floor.

Heating.—Ground, first and second floors will be heated with hot-water radiators. The heating arrangements for the scientific or research rooms on the lower ground floor are somewhat complicated and special equipment will be designed to meet the varying temperature requirements.

Ventilation.—Mechanical ventilation will be provided to the lower ground floor the air being cooled in summer and tempered in winter. Separate mechanical exhaust ventilation will be provided to the photographic dark room and common room on the first floor.

The estimated cost of the building and its services is—

	£	50,400
Building	50,400	
Services	608	
Stormwater and sewerage	100	
Sewer pump in basement	10,000	
Electrical installation	100	
Roads, paths, &c.	11,000	
Mechanical installations	21,638	
Total	72,268	

"Granolithic" means cement rendered, with granite chips having carborundum added for extra hardness and non slip surface.

34. *To Senator Nash.*—"This material should not affect the feet of members of the staff because they will not be in the constant temperature rooms very long.

35. *To the Chairman.*—"I do not know how much the present building cost. There is nothing on our files to indicate why the central block was not erected, although the Federal Capital Commission considered its construction in 1929. Apparently the job was deferred and the government of the time considered that the Council for Scientific and Industrial Research could do without that block.

The roofs of the present building are flat. Flat roofs have given trouble in the past, but experience has taught us to guard against this.

It is estimated that the building will require the use of 300,000 bricks, 170 tons of cement, and 35 tons of reinforcing steel. If the bricks were eliminated from the external walls in favour of the use of coke breeze or concrete, we would save 200,000 bricks. However, I have been assured by the Director of Works at Canberra that bricks will be available for the building. The use of coke breeze or concrete would increase the amount of cement required by 80 tons also the amount of reinforcing materials by 16 tons. I have been informed that bricks are available in Canberra and that the supply is reasonably constant. Government-owned brickworks are operating there. Cement is becoming available in increasing quantities.

The man-power required for the erection of this building may have a slight effect on housing projects. However, I point out that, if works of this character are carried out in Canberra, it will be necessary to bring in builders organizations which are perhaps not available there now, and this will ultimately be reflected in increased activity in house construction.

Tiles were being manufactured in Canberra by the Government some years ago, but the plant is not available to-day. Cement tiles are now being produced by private enterprise in Canberra. Cement tiles make a satisfactory roof, but their use is not recommended for this building because the pitch required by this material would result in a prominent roof outline, aesthetically wrong in this instance.

We have given full consideration to the appearance of the front elevation of the proposed building. The design will harmonize with the treatment of the existing blocks. The appearance of the completed central block and the flanking wings will be elongated, but we are committed to that by the fact that the two wings are already in existence. The drawings of the proposed building give a satisfactory design. Members of the committee will notice from the drawings that the roof will not be flat. However the pitch will not be visible from the ground, thus the building is given the appearance of having a flat roof similar to the flanking wings.

I believe that a different treatment of the fenestration from that which is proposed would result in a lack of harmony with the two existing buildings. We have considered this point and have designed the building to be in keeping with the existing structures.

Ready-mixed concrete is being produced in the capital cities of the States. Its use has proved economical and beneficial to the building industry. However, no such companies are operating in Canberra at present. In certain circumstances, ready-mixed concrete can be obtained more cheaply than it can be mixed on the job. The reverse is the case in other circumstances. This is governed by the conditions of the job.

36. *To Mr. Connelan.*—"The floor of the entrance hall could be finished with terrazzo instead of the proposed polished wood blocks. We thought that we would introduce a little variation. Certainly terrazzo stands very well.

37. *To Mr. Russell.*—"There would be little difference between the cost of terrazzo and that of wood blocks.

38. *To Mr. Connelan.*—"There will be a concrete floor beneath the canvas underlay in the corridors. Except for the brick work, the building will be of reinforced concrete. Concrete makes a good floor.

Specially prepared acoustic material will be used in the ceilings to reduce the volume of sound. There is a variety of such materials on the market. It is a matter for the Director of Works to decide which material he would specify.

You ask whether the glass required for this building would interfere with the progress of housing. Glass has been in short supply, but, as with many other commodities, the output is increasing. Allowing for the time taken to call tenders and to sign a contract, the glass would not be required for the building in less than six months.

39. *To Senator Nash.*—"The recognized percentage profit allowed to a builder is 10 per cent. The profit to the contractor therefore would be that percentage of £72,000.

I do not think that men would be available to do the work by day labour. The contractor will have to secure the labour required. The department has a standing advertisement calling for building tradesmen and labourers to work in Canberra and the Northern Territory and, although there is a response to those advertisements, it is not adequate.

I was Acting Director of Works at Canberra when the Government decided to bring in 600 tradesmen from overseas, and I made the suggestion that it would be fitting for those men to undertake to remain in Canberra for twelve months after arrival, in view of the fact that they would come to Australia at government expense. I understand that the suggestion was rejected. The men could not be bound.

40. *To Mr. McLeod.*—"The answer to the labour problem lies partly in the fact that each contractor has personal contact with many men. Therefore the successful contractor for this job should be able to induce men to come to Canberra, whereas they might not do so at the request of the Government. Government departments offer fair conditions, but they are able to pay only award rates, and in these days a contractor will pay higher than the award wages.

41. *To Senator Nash.*—"The supervision of works such as this proposed building is the responsibility of the Director of Works and his staff.

42. *To Mr. Connelan.*—"The use of hardware in the building will not interfere with the housing programme. Supplies should be ample. There might be delay in obtaining sinks and fittings of that character.

43. *To Mr. Russell.*—"There has been a general increase of production of these articles. Output depends somewhat on the industrial situation.

44. *To Mr. McLeod.*—"The chances of obtaining a contractor for the job are improving. The situation in this regard has eased slightly. More tenders are being accepted to-day than some months ago, although the situation is not so satisfactory as we should like it to be.

45. *To Senator Nash.*—"I could not say offhand how many workmen are permanently employed in Canberra by the Department of Works and Housing. The Director of Works can supply that information.

46. *To Mr. Russell.*—"It would be hard to state whether there is greater competition to-day than some years ago for big jobs. The number of big jobs coming forward is very limited, and the position is not clear yet. Twelve months ago there was virtually little competition between contractors for large works.

47. *To the Chairman.*—"For the information of the Committee I shall dissent the amount of £10,000 estimated for the cost of electrical installations. The installation of light and power will cost £5,000. The provision of fluorescent lighting, with fittings, will cost £1,500. The special power requirements for the base-ment, where the constant-temperature rooms will be located, will cost £1,000. The main switchboard, provided, will cost £1,000. The main switchboard, distribution boards and feeders will cost £1,500. Underground services to the new building and temporary supply to the existing wings during building

operations will cost £1,000. The details for this estimate are not yet fully known. In the absence of complete detail, the electrical engineers have allowed a considerable margin for contingencies. They have increased the estimate beyond the one that was originally given.

48. *To Mr. Connelan.*—"The respective costs of terrazzo and wood blocks for the flooring of the entrance hall would be almost identical.

49. *To Mr. Russell.*—"Terrazzo gives remarkably good service. It rarely needs to be replaced.

50. *To the Chairman.*—"Only a small quantity of timber would be required for the floor. Terrazzo would certainly be more durable than wood.

51. *To Mr. Connelan.*—"It is a matter of opinion as to whether terrazzo has a better appearance than wood. A good job could be done with either material.

52. *To the Chairman.*—"A wooden floor polished with wax could be dangerous underfoot. Terrazzo retains its appearance over many years of wear and tear. It is easily washed. If the Committee wishes I shall have it changed to terrazzo.

53. *To Mr. Russell.*—"Terrazzo is in production in the capital cities and can be supplied.

The witness withdrew.

James Fleming, Chief Mechanical Engineer, Department of Works and Housing, sworn and examined.

54. *To the Chairman.*—"I am aware that the Committee is inquiring into the proposal to erect an administrative building for the Council for Scientific and Industrial Research, at Canberra. I have prepared the following brief description of the proposed mechanical engineering services for the building:—

1. Ground, First and Second Floors.—A central hot water radiator heating system will be installed to serve all occupied spaces on the ground, first, and second floors. The water will be heated in an oil-burning, cast-iron sectional boiler located in the plant room on the lower ground floor and circulated through horizontal pipe loops connected to the radiators on each floor. A small centrifugal pump will be installed to circulate the water.

The boiler will be automatic in its operation, and will only require periodical inspection and servicing. The boiler heating capacity is estimated at 550,000 British thermal units per hour and the radiators will have a total heating surface of 2,200 square feet.

As these three upper floors have good natural ventilation, it is not proposed to install mechanical ventilation, except in the case of the common room on the third floor, which may be more densely occupied than other parts, and the dark room also on the third floor, which has no natural ventilation. Each of these rooms will have a small and simple form of mechanical ventilation.

2. Lower Ground Floor.—(a) Constant Temperature Rooms.—The lower ground floor contains twenty small rooms each of which is to be automatically held at a predetermined temperature with a fine degree of accuracy. The rooms are marked 1 to 15, excluding 9, and 3a to 8a inclusive on plan C.D.1447.

The specified temperatures for the various rooms range from a minimum of 32° Fahrenheit to a maximum of 120° Fahrenheit, and the permissible fluctuation in temperature varies from $\pm 0.5^\circ$ Fahrenheit to $\pm 2^\circ$ Fahrenheit.

To fulfil these conditions requires both heating and cooling throughout the year, and separate temperature control in each room.

An oil-burning boiler, separate from that installed for the radiator heating, and much smaller than the latter, will be installed in the plant room to provide the heating, and refrigerating plant to provide the cooling.

The unit will be installed a small heating and cooling unit which will be suspended from the ceiling at an appropriate position. The unit will consist of a motor driven propeller fan and a coil for heating or cooling assembled to

form a self-contained unit. The fan circulates the room air over the coils where it is heated or cooled to the required temperature. Warm or chilled water from the plant room, as required to maintain the correct room temperature, is circulated through the unit coils, the flow of water being automatically regulated by the room thermostat. In case of the low temperature rooms, brine will be used instead of water for cooling.

The cooling plant will have a capacity of 7½ tons of refrigeration per 24 hours and the heating boiler 100,000 British thermal units per hour.

We have nothing exactly similar to that system, but we have substantially smaller installations. For instance, we have buildings with one or two controlled temperature-rooms but we have no building with twenty such rooms. The description continues—

(4) *Ventilation*.—The preparation and apparatus rooms, mechanical services plant room, seed store, furniture store, and propagation room will be mechanically ventilated. These rooms are all on the lower ground floor where there will be no natural ventilation. Evaporatively cooled air in summer, and warmed air in winter will be distributed to those rooms through ductwork from a ventilating plant located in the plant room.

(5) *Air-conditioning*.—The incubation room is to be maintained at a constant temperature of 68° Fahrenheit, to within an accuracy of $\pm 2^\circ$ Fahrenheit.

A package type unit conditioner will be installed in the plant room and connected by ductwork to the incubation room.

Hot and chilled water will be supplied to the conditioner coils from the refrigerating plant and boiler mentioned in paragraph 2 (a).

3. The estimated costs are—

Control hot water heating system .. .	£2,500
Equipment for the constant temperature rooms and incubation room .. .	7,550
Ventilation in lower ground floor, common room and dark room .. .	950
Total .. .	£11,000

55. *To Senator Nash*.—That figure is included in the estimate of £72,000.

56. *To the Chairman*.—The cast-iron radiators will be imported. The cast-iron boilers will probably be made in Australia, although they are in short supply now. The refrigerating plant and the ventilating plant will all be made here. Unfortunately, automatic controls are obtainable only from the United States of America. I estimate that about £300 or £400 worth of this equipment will be imported.

57. *To Mr. Conelan*.—The type of boiler required for this building is very much smaller than those at the power alcohol distilleries which you mention. The department has obtained a number of big steam boilers from the Disposals Commission.

58. *To Mr. McLeod*.—All surplus material of that nature is passed over to the Disposals Commission, which circularizes lists to the Department of Works and Housing before the material is submitted to auction. The department reserves anything which it thinks it can use. It obtains a lot of equipment in that way. A lot of machinery is available just now as going concerns. It is better to dispose of equipment in that way than to pull it to pieces and use the materials. The boilers at the power alcohol distilleries would not be of any use for the building that the committee is now considering.

59. *To the Chairman*.—I would not say that imported equipment is any cheaper than Australian-made equipment. It all depends on what the equipment is. Some lines cost about the same amount, whether they be made in Australia or imported, and other lines cost considerably more when they are imported.

We can never forecast how long we shall have to wait for the supply of any materials, whether they be imported or locally produced.

60. *To Mr. McLeod*.—Conditioner coils consist of copper piping with copper fins on the outside. That equipment is locally produced. We can have them made quickly enough if the manufacturer is able to get strip copper for the fins.

61. *To Mr. Russell*.—I estimate the cost of materials that will have to be imported at £300 or £400. Cast-iron radiators and a few automatic controls for the constant temperature rooms must be imported.

62. *To the Chairman*.—None of the equipment required for the mechanical engineering services will cause interference with home-building. We do not use anything at all that is used in home-building. We use black iron piping, whereas galvanized piping only is used in home-building. Copper is used for hot-water services in homes, but the quantity of copper that we need on this job will be very small, and I do not think it will have any appreciable effect on home-building. Copper is not used in large quantities for home-building.

63. *To Mr. Conelan*.—The project for piping steam from the power house at Canberra to office buildings, which I mentioned to this Committee on another occasion, is still on the programme. We are going ahead with it. The new building for the Council for Scientific and Industrial Research could not be supplied with steam in that manner. In order to carry the steam to the building, we should have to lay an additional 3 or 4 miles of piping at least. The building will be over near Black Mountain. It would not be a payable proposition to carry the steam pipe as far as that. The distance from the power house to the site of the second administrative building is about 3,000 feet. That building is a great deal further away from the power house than the first administrative building, and it represents approximately the limit that we contemplate for piping steam from the power house. The scheme includes Parliament House, the two secretariat buildings, the new National Library, the Patents Office, the Kurrajong Hotel, and probably Barton Hostel and the new hostel. There is a large group of buildings within the range that we propose, and they will take the full output of steam from the present power house. We hope that, by the time we put this plan into operation, we will not require to generate any power from the power house. Shortages of equipment in the main New South Wales power houses should be overcome by then, and we hope that Canberra will be able to obtain sufficient power from Burrinjuck and from the seaboard power houses. It does not pay to generate power in Canberra because of the cost of hauling coal an additional 200 miles beyond the seaboard power houses.

64. *To Mr. Russell*.—The proposed building will have ordinary hot-water radiators for heating purposes. There is nothing unusual about maintaining a room temperature within 1 degree Fahrenheit. We have done that in munitions laboratories and we anticipate no trouble in this instance.

65. *To the Chairman*.—The existing wings have a small basement each to accommodate a heating plant. The new building will have a full-length basement. The main reason for this is to provide for the constant temperature rooms, for which an underground situation is ideal. Having them underground will make the task of controlling temperatures much easier than otherwise. There are not the same violent external temperature changes in a basement as there are in upper rooms.

The witness withdrew.

(Taken at Canberra.)

SATURDAY, 29TH NOVEMBER, 1947.

Present:

Senator LAMP (Chairman).

Senator Nash. Mr. McLeod.
Senator O'Sullivan. Mr. Russell.
Mr. Conelan.

Alexander John Nicholson, D.Sc., Chief of the Division of Economic Entomology of the Council for Scientific and Industrial Research, sworn and examined.

66. *To the Chairman*.—I am aware that the Committee is inquiring into the proposal to erect a Council for Scientific and Industrial Research administrative building at Canberra. I have prepared the following statement—

In August, 1929, the Parliamentary Standing Committee on Public Works recommended the erection of the laboratory building of the Division of Economic Botany (now the Division of Plant Industry) and of the central block between the laboratories of Economic Entomology and Plant Industry. Since then many efforts have been made to get the central block erected. New sets of plans have been drawn up from time to time to meet the increasing and changing needs of the two Canberra Divisions. In 1939, tenders were actually called for, but owing to financial difficulties at that time the central block was not erected then, nor was it found possible to have it built during the war years. The provision of this building, therefore, would merely meet requirements that became urgent at least fifteen years ago; it would provide only a small part of the additional laboratory space that is now urgently required owing to the considerable increase in the scientific staff of the two Divisions that has taken place during recent years because of increasing demands on their services. To meet this need additional laboratory buildings are required. Briefly, the central block of the Canberra laboratories is required for the following purposes—

- (1) to provide adequate space for ancillary services;
- (2) to free laboratory space at present occupied by these services; and
- (3) to provide constant temperature rooms.

Ancillary Services.—In order to carry out its investigations efficiently, the research staff requires the support of many special services. It needs a specialized technical library; the assistance of a biometrical staff to analyse statistically results obtained; the services of photographers; the services of clerks and accountants to attend to the internal administration of the two divisions, including the ordering, storage and issuing of materials and equipment; and the maintenance of records (which are both complex and voluminous); and the assistance of typists in handling correspondence, reports, and the preparation of scientific papers. Up to the present, these services have been accommodated in the Entomology Building, where they occupy a number of rooms designed as laboratories—a "temporary measure" adopted in 1929 when the building was first occupied. The use of valuable laboratory space for this purpose is undesirable. In addition, the space provided is completely inadequate for these services, which are so cramped that it is difficult to maintain their efficiency. With the increase in the research staff, not only in Canberra, but also in the other stations associated with the Canberra divisions, the ancillary services must be expanded considerably. This will be impossible without the provision of additional space for them.

In the plans for the central block the space provided for the ancillary staff is little more than barely sufficient for immediate requirements, except that the library has been designed to allow for expansion at the present rate for a period not more than five years from now. In addition, there is provision for offices for the Chiefs and Technical Secretaries of the two Divisions, and for a staff common room which can also be used for staff meetings and lectures. There is also a basement, which will be discussed later.

Release of Laboratories.—After the Division of Plant Industry moved into its own building in 1932 the laboratory space available for the Division of Economic Entomology was fairly adequate for the research staff. In addition, there was this staff fifteen years ago, but since then the space available for it has been reduced; for in 1932 the ancillary services occupied only one large and one small laboratory, whereas now they occupy two large and one small laboratory. Thus it is seen that the recent removal of the library to a temporary building, while somewhat reducing the congestion that existed during the war years, has not given us back even the

F.8050.—3

laboratory space we had when the Division of Economic Entomology was first established. Space available to the research staff has also been reduced by the installation of much bulky equipment, and by the great increase in the collection of a necessary adjunct to the work of the Division. Congestion in the laboratories has for long made the efficient prosecution of investigations very difficult indeed.

When the central block is completed, transference of staff will free two large and two small laboratories in the Entomology building. This will relieve congestion to some extent, but it will not provide adequate accommodation for even the present research staff; and more investigators must soon be added to our staff if we are to carry out all the work we are expected to do. Additional laboratories are urgently required, not only to provide adequate space for our research officers, but also to provide special facilities not available in our present building.

Constant Temperature Rooms.—The activity and growth of insects and plants is greatly influenced by temperature. Consequently, unless one can control the temperature to which the organisms under study are exposed, work on these organisms must be confined to that portion of the year during which the prevailing temperature are favorable. With an adequate provision of controlled temperature rooms, however, the investigations can proceed at any time at the convenience of the investigators. This leads to great economy in time and effort, and to the achievement of results much earlier than would otherwise be possible. In addition, there are important lines of investigation for which the provision of conditioned space is absolutely essential.

The small number of controlled temperature rooms in the present Entomology building is quite inadequate for the work in hand, so that important investigations are often greatly delayed, or simply cannot be undertaken. In the plans of the basement of the central block provision is made for conditioned rooms that will go far towards meeting this special need. However, they should be supplemented in the near future by other conditioned rooms with daylight illumination; provision for these is made in plans already prepared for another building.

Conclusion.—In brief, the building of the central block will do little more than meet a need that became urgent at least fifteen years ago, additional buildings being required to meet our full present needs. With the central block available, however, the ancillary services, which are at present under well high intolerable conditions, will be adequately housed, some laboratory space will be freed to be used for its proper purpose, and some additional facilities will be provided for the research staff. It is therefore respectfully urged that the central block of the Council for Scientific and Industrial Research (Canberra laboratories) be erected at the earliest possible moment.

67. *To the Chairman*.—The Division of Economic Entomology deals wholly with insect pests of all kinds whether they attack animals, plants, woods or any other material useful to man. In the early days our largest problem was the sheep blowfly. We are not now placing as great stress on that work as we did in the beginning, because to a large degree the problem is solved, not wholly by our efforts, but jointly with the Division of Animal Health and Nutrition, which is another section of the Council for Scientific and Industrial Research. You will know of the development of the modified Mules operation which has done a great deal to protect the sheep from the modified blowfly, and also blowfly dressings which were evolved by this Division and which gave much better control. Other aspects of the blowfly were also tackled.

One of our major projects at present is cattle tick in Queensland, and the work of the last few years has indicated that the problem can be regarded as very near solution at present. The constant dipping in arsenical solutions over a number of years has led to the development of a strain of tick which cannot be killed by dipping in arsenical solutions. However, the development of ways of applying DDT, which was a difficult problem, has provided a means of handling these arsenic-resistant ticks. DDT is much more satisfactory than arsenic. It does not injure the animal as arsenic did. However, it is more expensive, although the apparent expense is greater than the actual expense because, as DDT is more efficient, the number of dippings can be greatly reduced.

The buffalo fly problem is virtually solved. The insects, which had been known in this country for more than 100 years, within the last twenty years suddenly began to spread into more important country, and in very recent years to the coastal areas of Queensland and the better cattle-raising areas. We discovered more than one method of dealing with the problem. First by a special kind of trap which was most effective in handling dairy herds but not beef cattle. However, it became obsolete when we discovered that by using small amounts of DDT on half of the animals in a herd we got complete control of the insect. The control of the buffalo fly is simpler than that of almost any other insect. A great deal has been said about the spread of the fly to New South Wales. We hold out no hope of preventing the spread, but the method developed for dealing with the pest is almost perfect.

68. *To Senator O'Sullivan*.—The fly will be very nearly eliminated. Our method of dealing with it is very simple. It only involves putting a small quantity of DDT on the backs of part of each herd. There is another point worth mentioning. If the cattle are dipped in DDT to control ticks, they need no further treatment for buffalo fly. The character of DDT is to persist in active form on the animals for so long that it will practically exterminate the fly. The fly spends most of its time sitting on the backs of the animals. They move from animal to animal until they settle on the back of an animal that has been treated with DDT. DDT persists so long that adult insects coming from eggs present at the time of dipping will be killed. In that way we can wipe out a complete generation of the fly. However, we do not expect that this will lead to complete eradication of the pest, because we cannot control migration of the fly from infested properties. But if DDT is adopted for the control of cattle tick, buffalo fly will not be a problem requiring other special measures.

Those are the major cattle problems. They illustrate the type of work being carried out in connexion with insect pests on animals. Similar investigations are proceeding in respect of many pests in a variety of other spheres. Those examples will be sufficient to indicate the work being done, and the necessity for the proposed building so far as my division of the Council for Scientific and Industrial Research is concerned.

69. *To Mr. Russell*.—It is not necessary to spray all the animals with DDT, because eventually the fly will settle on one of the animals that has been sprayed.

70. *To the Chairman*.—You asked me how much of the present building has been used for office space for my division. Only part of the work can be separated on that basis. Approximately one-quarter of the building at present is occupied by the ancillary services to which I have referred, plus my own office, and that of my technical secretary. Those rooms are fitted for use as laboratories. Most of the laboratories are used for the dual purpose of laboratories and offices.

The new building, when erected, will provide barely adequate laboratory space for our present needs. We could consider appointing additional technical staff if we had the room for them, but we could not do that at present under favorable conditions.

With respect to future expansion we have the plans for various other buildings which will meet our total requirements. This is the only building that has been submitted to the Committee.

71. *To Mr. Conelan*.—The other buildings include the new block to the left of the present building and a block behind the present building, which is designed as air-conditioned laboratories. In the basement of

the proposed centre block now under consideration constant humidity can be maintained, but artificial light will have to be used. For some work that is satisfactory, but for other work we need daylight; so, we need conditioned laboratories with daylight. We have complete plans for a new building between the main building and the insectaries. That building will be approximately 100 feet long.

72. *To the Chairman*.—You ask me how much of the new building will be required for my division. Most of the space in that building will be for common services. It is hard to say how much is for one division and how much for the other. Actually, in the basement, three-quarters of the space has been suggested for my division. In the rest of the building there is a library which is run as a common service. All the clerical staff and accountants work for the two divisions. The biometrical staff are on call to both divisions, and so are the photographers. There are a number of ancillary services of a type which both divisions require. It is felt better to have common services than to have separate services for each division. Practically the whole of the building will be occupied by common services, excepting a pair of rooms for the Chief and his technical secretary for each division.

We always keep in close contact with the States. Anything we think is of interest to them is passed on to them. Our officers maintain close relations with the various officers in the States. We get good co-operation in that respect.

73. *To Mr. Conelan*.—The State departments do not contribute to the cost of our experiments. In certain work, such as cattle tick work in Queensland, the Queensland department co-operates with us. That work is controlled by a committee on which we are represented. But we finance our work and they finance theirs.

74. *To the Chairman*.—You ask me whether our officers are well housed in Canberra, and whether accommodation can be found for additions to the staff consequent upon the erection of the new building. It is not easy to answer that question. Many of our officers are well housed. Some who arrived here recently are experiencing difficulty and many of them have not been able to obtain accommodation of the kind they feel they should have; but they are doing reasonably well.

You ask me whether, while we are making plans for the new building, we should not be making arrangements for the housing of the additional staff in consultation with the Department of the Interior. If it were possible for us to do that we should do so. However, having regard to present limitations on staff owing to our limited laboratory facilities and limitation of materials, our officers take their turn.

We have not attempted to introduce a parasite for the codlin moth. The general situation is that the codlin moth is a world-wide pest, and a major pest in the more temperate countries. For many years attempts have been made to use parasites, but without success. America has expended enormous sums of money in that direction, but without success. We are keeping in touch with their work, and the moment we see any possibility of getting a suitable parasite we shall go ahead. But for some reason it is difficult to handle the codlin moth by parasites. Entomologists who have gone into this problem carefully realize that we cannot expect to get an effective parasite against every pest. We know that it is the ideal method of control and we always want to use it. But we realize, also, as in the case of the blowfly, that the chance of

getting an effective parasite is almost nil. Therefore, we must carry out work on chemicals. We have had no glimmer of hope of getting a parasite to deal with the codlin moth. We introduced a parasite against the oriental peach moth, but it was a failure here although effective in America. Our failure was due to the fact that we could not introduce an alternative host to make the parasite work. The parasite comes out in the winter, but in this country it has nothing to attack as is the case in America, where it is thus enabled to pass through the winter. Here we cannot bridge that gap.

75. *To Mr. Conelan*.—The plan for the centre building now under consideration is totally different from the plan advanced in 1939. We are glad that the 1939 plan was not proceeded with, because it was really an austerity plan. We had been fighting for money and eventually drew up a plan based on our absolute minimum requirements. We very nearly got it; but it did not meet our requirements at that time by any means, and it would be wholly inadequate now because our needs have increased. The 1939 plan was smaller than the original plan. The present plan is adequate for our immediate needs, that is, for the next two, or three, years. When it is supplemented with the other buildings that are already planned, it will be adequate; but it needs to be supplemented with the other buildings we are planning for. Those other buildings could not be attached to the centre block. The centre block on the plan now under consideration has been enlarged considerably on the original plan and will occupy practically the whole of the space available unless we alter the character of the buildings. The only way to make it much bigger would be to carry it a considerable distance forward, because there is no room at the rear. It would not be satisfactory to enlarge the centre block in that way if we are able to proceed with the other buildings; but without those other buildings the centre block will not meet our present needs. If we can get these other buildings we can say that the centre block should be adequate for the next ten or fifteen years.

76. *To the Chairman*.—The centre block is needed to connect the two existing wings.

77. *To Mr. Conelan*.—The plan for the centre block cannot be enlarged without making a complete change which would give us an undesirable form of building. To add an extra story would put it out of balance, and we cannot go to the rear because of the hill. The only alternative would be to push it too far forward.

78. *To Mr. McLeod*.—You suggest that owing to lack of space and accommodation we cannot carry out additional investigations. I cannot say that that is exactly true, because we have another difficulty as well as lack of space. We have extreme difficulty in recruiting staff. Very few good research men are coming along. We have a number of vacant positions on our estimates at present, and if we could get suitable men we would fill them. If suitable men were available we would seek more staff. Thus we are limited in extending our investigations by the inadequate supply of recruits to our research staff. However, lack of space has been interfering with our work. We obtain our research staff through the universities.

79. *To Mr. Conelan*.—The salaries of research staffs have been greatly improved.

80. *To Mr. McLeod*.—The war left a big gap in the supply of suitable research staff. I believe that in two or three years we may get over this difficulty, but we are now feeling a big gap due to the fact that no people were being trained during the war. They are being trained now. We shall need extra staff when they are available.

81. *To Mr. Russell*.—The shortage of housing has had some effect on the recruitment of staff. We have negotiated with people to come here, and they might have come here if they had not been frightened off by the housing shortage. It is difficult to say whether that was the real reason, because the applicant simply tells you that he has decided not to accept appointment. I strongly suspect that it was due to the difficulty of getting accommodation.

It is difficult to estimate our present shortage of staff. At present with the investigation in hand and the immediate investigations, I should think that we require eight, or ten, research officers plus an equal number of assistants to do the routine jobs. But if there were a reasonable chance of getting suitable men—and I would consider only appointing really suitable men—I would increase that figure considerably. It would mean that we could take up other lines which we know should be followed but which we have not even planned because of the difficulty of getting suitable staff. I should require time to estimate our staff requirements ten years hence.

82. *To the Chairman*.—You ask me what would be our requirements if we had the necessary staff and materials. We deal with problems as they arise, but, in addition, we try to maintain, as we are just managing to do to-day, a fair proportion of our staff dealing with work of a background character which is not of immediate practical importance, but upon which all the rest of the work must rest. It is fundamental work on which other work will be based. Unless we have that going on we can expect only inferior work on the practical side. There are immediate practical problems, and behind that we have a staff which we like to leave completely separate to carry out fundamental work on which we expect later practical work will be based.

83. *To Senator Nash*.—Under our original act we can deal only with problems of common interest to two or more States. There are very few problems in my division confined to one State. So far we have not met a problem in respect of which our investigations are limited because it is confined to one State. That provision does not hamper us in any way. The State entomologists look after problems confined to one State and any State which was short of staff would be content to let us handle its problems.

84. *To Mr. Russell*.—We are not investigating the fruit fly. It is not one of our present problems, but we are considering it as a project on the biological control side. Attempts to use parasites do not look very promising. Much of that kind of work has been carried out, particularly in Honolulu, and they feel there that it is an almost hopeless problem. The fruit fly has been dealt with fairly thoroughly by Queensland and New South Wales.

85. *To Senator Nash*.—You refer to a report in the Western Australian press that about 10,000 fruit trees are to be destroyed because of some disease. We have not been consulted on that problem. Apparently, it is purely a State matter.

86. *To Mr. Conelan*.—Work on bunchy top was carried out in Queensland wholly by the Queensland Department of Agriculture.

87. *To the Chairman*.—In respect of housing accommodation for our staff, we have not negotiated with the Department of the Interior to be allotted a percentage of new homes erected in Canberra. We approach the department as each new member of the staff comes along. Usually he would go on the waiting list. In unusual circumstances we make special representations and sometimes they meet us. They always do their best for us.

The witness withdrew.

(Taken at Canberra.)

MONDAY, 1ST DECEMBER, 1947.

Present:—

Senator LAMR (Chairman).

Senator Nash. | Mr. Howse.
Senator O'Sullivan. | Mr. McLeod.
Mr. Conelan. | Mr. Russell.

Bertram Thomas Dickson, B.A., Ph.D., Botanist,
Chief of the Division of Plant Industry of the
Council for Scientific and Industrial Research,
sworn and examined.

88. To the Chairman.—Evidence was given before
the Parliamentary Standing Committee on Public
Works in 1939 concerning the erection of laboratories
for the Division of Plant Industry, then known as
the Division of Economic Botany, and the central
block between the Divisions of Economic Entomology
and Plant Industry (Economic Botany) under
authorization of Parliament dated 11th March, 1939.

The Parliamentary Standing Committee on Public
Works as of date 28th August, 1939, recommended:—

After full inquiry into the scope of the proposed laboratories
and a careful consideration of the representations received
from the various State Directors of Agriculture, the Com-
mittee realizes the importance of the work devolving upon
the Council for Scientific and Industrial Research and the
very great good to Australia that may be expected to result
from the successful carrying out of the various problems
of research undertaken. The Committee, therefore, is
unanimously of opinion that the establishment of the proposed
laboratories for the Division of Economic Botany, suggested,
are fully warranted, and, subject to the reservations men-
tioned above, recommends that the erection of the necessary
buildings should be proceeded with as early as practicable.

M. D. CAMERON, Chairman.

The programmes of work envisaged then for the
division comprised investigations in the following
major fields:—(a) Plant diseases; (b) plant breeding;
(c) investigations into the physiological requirements
of crop plants; (d) agrostology; (e) soil biology;
(f) plant introduction; (g) weed control, including
poison plants. Subsequent to the aforesaid recom-
mendation of the Parliamentary Standing Committee
on Public Works, the erection of the laboratory block
for the Division of Plant Industry (Economic
Botany) was proceeded with and completed in 1932.
Because of the incidence of the depression period, the
erection of the central block was not proceeded with,
and that block is still not erected. In the meantime,
because of the imperative necessity to proceed with
investigations, the staff has been greatly increased
but we are now in a serious position with respect to
the provision of adequate accommodation. The
interim of nearly twenty years has brought about a
position in which not only are we handicapped by
the lack of the accommodation originally planned to
be provided by the central block of the present group
of buildings, but also our urgent needs have overtaken
by nearly ten years those accommodation requirements,
so that to-day not only do we suffer from the lack
of the central block, but we need additionally at least
two other laboratory blocks in order adequately to
accommodate the staff. This has been brought about
not only by the natural increase of the demands for
investigations but especially because of the additional
urgent demands for work on pastures and wool research
under the Wool Research Trust Account. I venture
to prophesy that we shall be asked still further to
augment our research in the fields of beef, oil seeds,
fibre and, perhaps, rice production. Dr. A. E. V.
Richardson, Chief Executive Officer of the Council
for Scientific and Industrial Research, will, I expect,
have given you data about the staff now in occupancy
of the present buildings as compared with the staff
in the early years of our programme. I think that

it is essential to recognize that a single scientific officer
may require the sole use of a laboratory, say 32 feet
by 17 feet, in order effectively to house and use his
equipment. The laboratories, preparation rooms,
library, herbarium, &c., all mean space requirements
per individual considerably in excess of those in most
government departments or business houses. In other
words, mere desk space is not the criterion. Our lack
of space is reflected in a number of ways. First, there
is acute congestion of work in many spheres.
Laboratories that should house one worker must accom-
modate three or four. Our balance room—a room
from which other activities should be excluded—has
to serve also as a laboratory for two research officers.
We lack many important facilities simply because
there is no room to house them. We have no adequate
seed testing laboratory, despite the high importance of
such a laboratory to meet our work in plant industry.
I should like to install a multiple temperature incu-
lator, but cannot do so because there is nowhere to
place it. We lack rooms with controlled temperature
and humidity in which to study with precision the
factors governing development of insect and plant life.
Our whole programme of chemical and physiological
studies is not only impeded but almost negated by
the lack of space to be devoted to such work. The
lack of space also has its effects on staff recruitment.
I am at present giving consideration to leaving unfilled
certain positions placed on the 1947-1948 Estimates.
Though these appointments are urgently needed, I
am concerned about our capacity to squeeze more
workers into our present Plant Industry building.
Without facilities, we cannot recruit, and without
recruitment we cannot fulfil our obligations. The
problem of recruitment is even more difficult in the
case of senior officers. As an example, I was
approached recently by a leading scientist, recognized
as the foremost authority in Britain on soil pathogens.
He is interested in the possibility of gaining employment
with the Council for Scientific and Industrial
Research in Australia and we need him for soil fertility
studies. In my reply I indicated our very real interest
in securing his services, but I had no alternative but
to describe the lack of facilities which he would
encounter in Canberra at present.

Temporary measures have been taken to secure
relief from over-crowding. The over-crowding in the
existing buildings has become so acute that in the
absence of any permanent construction, temporary
expedients have necessarily been adopted. In 1940
a set of wooden stables on the lower slopes of Black
Mountain was converted to accommodate certain phases
of the pasture work, particularly the handling of
research samples from field experiments. By 1946,
the accommodation position had deteriorated to such
a degree that some material relief, even of temporary
character, had to be adopted. Accordingly, arrange-
ments were made for the erection on the Black Moun-
tain site of three "Steel Frame" huts, each 60 feet
by 20 feet. The use made of each of these huts is
as follows:—

- (1) Accommodation of the joint library of the
two divisions. This enabled some expan-
sion of the space occupied by the clerical
staff in the Entomology Division. I regard
the housing of a valuable and irreplaceable
library in a prefabricated hut as contrary
to all safe practice. Indeed, Dr. Nicholson
and I faced a protest from the research
officers of the two divisions when the move
was announced, but we felt that the general
pressure for accommodation left no alternative
in this matter.
- (2) The second hut is subdivided into two parts,
one half housing the dehydrator for the
drying and handling of pasture samples;

the second serving as a general agrostology
laboratory, for hand separation, seeds work,
weighing, &c.

- (3) The third hut has one large room and two
small rooms. The large room serves as a
conference room and staff room; one of the
small rooms is a temporary mapping room
for a draftsman of the Division of Plant
Industry and another draftsman of the
North Australia Survey Party; the second
small room accommodates four technical
officers.

I have given this information in some detail to illus-
trate the acuteness of our accommodation problem.
Our immediate requirements are (a) central block
of the present group of buildings and (b) agrostology
laboratory.

I have noted earlier that the erection of a central
block was approved in 1939. This laboratory block,
which will join the present entomology and plant
industry laboratories, is planned to accommodate the
services which are necessary for the conduct of research
and to provide some additional laboratory space. It
will provide offices for the two chiefs and for their
technical secretaries. It will house the library, the
photographic services and the biometrics section, and
will provide special laboratories for controlled tem-
perature and light work with both insects and plants.
There is space for a committee room and for a larger
staff meeting room where slides and films concerning
the research work may be demonstrated. It will house
our scientific records, which have become very extensive
and which must be kept. Accommodation is also
provided for the staff which makes the records and
types reports, &c., for the records of our scientific
equipment, accounts and orders. All these services are
at present crammed into laboratories which are needed
for research workers.

The agrostology laboratory will comprise the first
unit of the second group of blocks, lying northwards
from the group comprised by plant industry, ento-
mology and the central block. The Agrostology Section
in its present form was set up in 1939, and naturally
became one of the most important sections of the
Division of Plant Industry. With the passing of the
Wool Use Promotion Act, its responsibilities have
greatly increased. The study of pastures and fodder
crops is an integral part of any overall research pro-
gramme into wool production and substantial funds
have been made available from the Wool Research
Trust Account for this work. In addition, funds are
available from the Wool Industry Fund to enable the
erection of a laboratory at Canberra to serve the
pasture workers. In determining Canberra as the
most suitable place in the Commonwealth for the erec-
tion of this laboratory, the following points were con-
sidered by the Executive Committee of the Council for
Scientific and Industrial Research:—

- (i) Canberra is centrally placed in the area of
densest concentration of sheep in the Com-
monwealth. There are about 3,000,000
sheep within 100 miles of Canberra and no
less than 20,000,000 within 300 miles.
- (ii) Canberra is well placed geographically to
enable access to other parts of the Com-
monwealth.
- (iii) The Agrostology Section already had its head-
quarters in Canberra and must maintain
contact with other sections of the Division
of Plant Industry, e.g., Plant Introduction,
Plant Physiology, &c.

Four principal regional centres are planned—Bris-
bane, Deniliquin, Adelaide and Perth—each with its
dependent field stations. This set-up is closely inte-
grated with the plans of the Divisions of Animal Health

and Production, Animal Nutrition and General Bio-
chemistry and Soils. The realization of this overall
plan for research under the Wool Use Promotion Act
hinges on the provision of adequate facilities for the
agrostology section at Canberra.

An urgent requirement is the physiology-chemistry
laboratory. The accommodation planned twenty years
ago for physiology, soil biology and general plant
chemistry is now completely insufficient, and it is
essential to provide the additional laboratory facilities
required in a building which will in many respects be
the counterpart, in the new group of laboratories, of
the central block now being discussed. The work
which will be done in this laboratory is basic to all the
investigations being undertaken in the Division of
Plant Industry.

I come now to our longer-term requirements. I use
the phrase longer-term requirements not as indicating
some possible need in 50 years time, but to cover the
building needs within say, ten-fifteen years. The full
development of our programme relating to the primary
industries will necessitate the considerable expansion of
the soils unit at Canberra serving a large section of
eastern Australia, broadly the eastern two-thirds of
Victoria and most of New South Wales other than the
south-west. Similarly, offices of the Division of
Animal Health and Production will be placed at Can-
berra when accommodation is available. It is not
inappropriate also to suggest that accommodation
should be provided for officers of State Departments of
Agriculture who may be co-operating in research with
us. We ought to have in Canberra laboratory accom-
modation for visiting scientists. It may be that
scientists from Great Britain, the United States of
America or perhaps China or India or some other
country will wish to come to Australia to study our
problems and we should be able to provide them with a
room or rooms in which to work. They should be able
to regard the Council for Scientific and Industrial
Research as their home while in Australia. If such
accommodation were available, I think that we could
attract younger workers from other countries, such as
the holders of scholarships and fellowships. Our rep-
utation is such that scientific workers from other coun-
tries will want to come here. Some of their time will
be spent in the various universities, but we should be
able to provide them with accommodation and equip-
ment in Canberra. Their research would help in the
general field of international science.

A third laboratory of the second building unit will
be required to serve the needs of such officers.

It is recognized that at the present time the pro-
vision of housing is an acute problem. Many of my
officers are suffering from housing difficulties. At the
same time it is equally urgent that we push ahead with
research into the many important problems facing the
primary industries of Australia at this time. It is
therefore essential to provide the accommodation for
research workers engaged in investigations designed to
find solutions to these problems, and it is respectfully
urged that the construction of the central block of the
present group of laboratories, which is already twenty
years late, be proceeded with as an urgent matter.

Although this inquiry relates specifically to the
central block I have thought it wise to deal with all the
buildings.

I am in charge of my own division and Dr. Nichol-
son is in charge of his division. We are fellow chiefs.
Although we do not actually have one officer working in
both divisions, officers belonging to both divisions co-
operate fully in many investigations. For instance,
where insect pests are related to plant diseases, the
officer in Dr. Nicholson's division dealing with the in-
sects concerned and the officer in my division dealing

with plant diseases would work together as a team. They may work in each other's laboratory. They do, in fact, use the same plots in the field for experimental purposes.

80. To Mr. Conelan.—I am not the Government, and cannot say whether Canberra will become the main administrative centre of the Council for Scientific and Industrial Research, but I think that it ought to be the administrative centre. My personal and professional opinion is that the administrative headquarters of the Council for Scientific and Industrial Research ought to be in the national capital where the Parliament of the nation is situated. I think that the present plans for administrative offices would be inadequate for administrative headquarters. The present scheme envisages a sister block to the one we are now discussing. It would be situated further north. Between those two blocks and facing University-avenue, and set back from the two laboratory buildings, is a big space which should be suitable for administrative offices. There are some small buildings now on the site. They are the only temporary and could easily be removed. The three buildings shown in the plan constitute one block. Another similar block is proposed to be erected further north. Behind them, higher up the hill and facing University-avenue is the site of the proposed administrative offices.

80. To the Chairman.—We have an arrangement with the Department of Health with respect to quarantine. An important section of my division is that dealing with plant introduction. One of my officers is now living with plant introduction. One of my officers is now in South America with an officer of the United States Department of Agriculture seeking plants. The arrangement is that when we find plants which we think would be of value to our pastoral industry, our horticultural industry or our fibre industry, we make arrangements with the Department of Health that any seeds, cuttings or sets may be brought in under a special certificate which the Department of Health approves and which I sign. The certificate is to the effect that the plant or plants will be grown under quarantine until I am satisfied that they do not contain diseases, or carry diseases or insect pests and that they are not likely to become weeds. When I am satisfied that those dangers do not exist, I arrange with the Health Department that its plant quarantine officer inspects the plant or plants. If he agrees with my views, the plants are released from quarantine, but until they are released from quarantine they are not available to any one. I think that the controls are effective. They are as near ideal as it is possible to reach. They are more effective controls than are exercised over people travelling from one country to another and carrying seeds in their pockets.

Although I am neither an engineer nor a builder, as the result of my occupation of the present buildings for fifteen years I have noticed a number of faults in the building to which I think attention should be directed. In my opinion, it is a mistake to have a flat roof because it makes drainage a difficult problem. In the summer the bitumen covering is affected by the heat, and sometimes blisters appear. When a blister breaks down water gets beneath the surface. It has penetrated the ceiling in a number of places. I could have shown you on Saturday a number of places where water had leaked through the ceiling. The windows are not waterproof, especially when a beating rain comes in from the west. The steel frame windows are not satisfactory, and not infrequently there are minor floods in the laboratories. We have adopted all sorts of schemes to keep out the water, but without much success. The heat of the sun on the flat roof causes expansion, with the result that the parapet has been pushed out of place. Many cracks are visible,

and at times fairly large pieces of concrete have fallen to the ground. Fortunately, no one has been injured. It would appear that no provision, or at least inadequate provision, has been made for expansion.

81. To Mr. Conelan.—It is certainly true that the maltoid covering has deteriorated. The roof has been leaking for the last ten years. In fact, the building had not been erected very long before the roof began to leak. I understand that the roof of the new building is to have some pitch in order to shed the water, the slope being hidden behind a parapet.

82. To the Chairman.—A beginning was made with a survey of plant diseases throughout Australia, so that an estimate of the annual loss might be made, but the survey was never completed. When the work was begun, I was able to obtain the services of Mr. C. C. Brittlebank, who had just retired from the Victorian Department of Agriculture. His knowledge of this work was unique, and he began to prepare the records. He continued his work until the depression, when, because it was necessary to effect economies, his services had to be dispensed with. The records are still in my office, but we have never had an opportunity since of continuing the work. The Agricultural Department of Victoria, New South Wales, Queensland, and Western Australia, keep records of the occurrence of plant diseases in their own States, and an attempt is made to assess the losses due to these diseases, but the over-all Commonwealth survey has not been continued. The Standing Committee on Agriculture is still in existence. It consists of the directors or under-secretaries of the State Departments of Agriculture, together with representatives of the Commonwealth Department of Commerce and Agriculture, the Council for Scientific and Industrial Research, the Department of Health, and the Department of Post-war Reconstruction. The committee meets every six months to discuss various problems. They plan a programme of work, and the investigations are allocated to various authorities according to the nature of the work. The Council for Scientific and Industrial Research may be asked if it can undertake some particular investigation, and if we are in a position to do so we become responsible for that position. The committee had not, in recent years, considered the preparation of a Commonwealth-wide plant disease survey. I was not aware that the Department of Commerce and Agriculture proposed Department of Agriculture of its own to conduct research. My own opinion is that the Council for Scientific and Industrial Research could do any work which such a laboratory would be likely to undertake. That, however, does not apply to the laboratory work to be done by the Department of Trade and Customs. Such work involves a good deal of routine testing. For instance, tests are made of the alcoholic content of spirits, and whether foods are true to label, or whether they contain deleterious materials. It is necessary to distinguish between routine examinations of that kind, which are only a matter of measuring, and research work which involves an attempt to find out something new. We in the Council for Scientific and Industrial Research are charged with the task of trying to solve problems, of trying to find out things, not previously known, in connexion with agriculture and industry. If we were to undertake routine testing of the kind mentioned, it would be necessary to have a much bigger staff and a good deal more accommodation.

83. To Mr. Conelan.—We have not had the site of the proposed building examined in order to see whether it would be in danger from flood water in the event of very heavy rain, but I assume that such investigations have been made by the Department of Works and Housing, or the authorities which will

be responsible for the construction work. I am reasonably satisfied that satisfactory arrangements could be made for carrying off ordinary storm-water, but what might happen in the event of a cloud-burst is difficult to forecast. The proposed building will be adequate for the immediate requirements of our staff in regard to records, typing, library, &c., but for future development it will be necessary that the sister block, which will, in the main, provide laboratory accommodation, should be completed as soon as possible. I hope that, well within ten years this sister block will be erected. In fact, it should be gone on with as soon as possible. The position is ideal in that it is in close proximity to the University site. As the University is planned to be a research institution, we should be able to work in with the University authorities very well, and might be able to provide accommodation for some of the research students.

84. To Mr. McLeod.—By crowding three or four officers into one laboratory which was designed for one man only, we have been able to undertake some research work into wool pastures under the terms of the Wool Research Trust Account. We are very anxious to get on with this job, because of the importance of wool to Australia. I am convinced that it will remain of importance for generations to come, in spite of the competition of synthetic fibres. Of 100 officers in my division, about one-half work in Canberra, and the other half in the various centres which I mentioned in my evidence, and in the field. Because of this decentralization we are able to undertake some investigation work associated with wool—mainly investigation into pastures, and the nutritive value of various grasses. Part of the work is done in the field and part of it has to be done at the central laboratory in Canberra. We do not concern ourselves with textiles. The executive committee has decided that for investigation into textiles it is better to establish laboratories near the great centres of industry. Sydney has been chosen for one such laboratory, and for the purpose of investigating flax and other similar fibres, a laboratory is to be established near Melbourne. I referred in my evidence to leaving certain positions unfilled. I had in mind the fact that, because of the lack of accommodation, certain investigations cannot be undertaken. We have to begin preparing our estimates in February so that they may receive Treasury approval, and be ready for inclusion in the budget later in the year. For instance, next February, I must begin preparing estimates for the year 1948-49. I am in the position now of having to refuse to undertake certain work, but I cannot say just how many officers will not be appointed because of this fact. The provision of the new building will give temporary relief, but I shall still be in difficulties until the sister block is completed. Provision has been made in the plan for extensive library accommodation, sufficient to provide for our expanding needs for some years ahead. In the meantime, part of this library accommodation can be used for other purposes—not, of course, for laboratory work—but for ordinary office work where men who work in the field need office accommodation to complete their job.

85. To Mr. Russell.—We are having difficulty in getting officers because of the housing shortage, but in that we are no different from other departments. When officers are engaged to come to Canberra they have to wait eighteen months before they get houses. In the meantime, we must keep them in hotels. I think we have about ten officers living in hotels at the present time, including some in Queanbeyan. The position is the same at Deniliquin, where we have a laboratory, and I have no doubt it will be little better in Brisbane when we open our laboratory there.

86. To Mr. McLeod.—We do not engage in large experiments with wheat, except in one respect. We have been studying a disease called "take-all", in order to learn what are the soil conditions and the plant conditions which obtain in the incidence of the disease.

87. To the Chairman.—We do not actually conduct experiments for the purpose of increasing the wheat yield per acre. With respect to wheat-breeding, the arrangement which was entered into in 1926 between the Council for Scientific and Industrial Research and the State Departments of Agriculture was that we would not engage in cereal breeding, that being regarded as their function.

88. To Mr. Conelan.—My last statement does not apply in quite the same way to rust. The position was different. We always feel that we should not duplicate or overlap with the work of the State Departments of Agriculture or other institutions, because there are so many scientific problems to be undertaken that no people would be so silly as to duplicate each other's work. It would be a waste of scientific man-power. Whenever we can, we avoid duplication. If we know that any individual is undertaking any given problem, and is doing it well, we are taking any given problem, and is doing it well, we are perfectly satisfied. It so happens that Dr. W. L. Waterhouse, of the School of Agriculture in the University of Sydney, has spent his life, since he returned from World War I, specializing on cereal rusts. He has done a remarkable job. Not only has he studied rust, but also he has bred wheat; and people have used his results and bred wheat which is free from rust, even as far north as the Darling Downs. Because of Dr. Waterhouse's excellent work, we never touch the field of cereal rusts. We are very happy to know that he is going ahead and we would help in any way we can.

89. To Mr. Russell.—I am asked whether we experience any constitutional difficulties in the various States with respect to our work. That is a difficult question. All I can say is that, when the Council for Scientific and Industrial Research was started approximately twenty years ago, it was regarded with a certain degree of suspicion and jealousy by the State Departments of Agriculture. That is a cold fact. Naturally the officers in those departments would say, "We have been trying to do research work as well as extension work, and here is a new body which will have lots of money, facilities and men able to undertake all these problems which we have been wishing that we could do for years". They naturally would feel rather sorry about that feeling of suspicion, and endeavour to make it clear that it was not our object to grab everything, and take all the credit. Gradually over the years, it can now be said that that jealousy and suspicion has been allayed. For example, our very frank and sometimes hot discussions around the table of the Standing Committee on Agriculture has gradually tended to bring about better relations between the Commonwealth and the States, and to-day, we often are obliged with regret to tell our State colleagues, when they ask us to undertake certain work, that we cannot do so because of lack of staff or facilities.

Perhaps I may use an illustration from my own personal knowledge. For the last twelve years, I have been chairman of a Commonwealth-State committee where all the tobacco exports from the State Department of Agriculture meet, and there we thrash out, not the tobacco problems of Victoria, Queensland or Western Australia, but all the tobacco problems. We ask: "How can we undertake experiments, and reach a solution of certain problems?" We have the frankest possible discussions, we record the minutes of the

meetings, and we circulate them to the various State departments concerned and they are dealt with at the Standing Committee on Agriculture. We have been doing that for twelve years.

A similar position obtains in regard to weeds. Some weeds present terrible problems in Australia, and we have been inundated with requests to undertake experiments for weed control. First of all, we had to state that we could not undertake all of them. We have not the staff. In addition, we should not undertake all of them. Some could be undertaken by the State Departments of Agriculture. We have what we call a "Weeds Co-ordination Committee" in each State. The members of these bodies include representatives not only of a Department of Agriculture but perhaps a Department of Lands, and we meet approximately twice a year and examine the list of weeds in a State and place them in categories in order of priority. Then we ask ourselves: "Who should deal with weeds in, say, priority number one?" and we might decide that that is a job for the Council for Scientific and Industrial Research. Some weeds in priority number two might be regarded as a joint job for the Council for Scientific and Industrial Research and the State department. The weeds in priority number three might then be regarded as a State job. Once we have arranged these categories, we know where we are, and we set to work. Even if a job is regarded as one for the Council for Scientific and Industrial Research, we make a point of keeping our State colleagues completely posted about all that we are doing, and obtaining their co-operation. They have all kinds of information, and they are able to supply pointers, which we would not know, because we are not in the field all the time, and they are. So we now have much better co-operation.

I could give another illustration of co-operation. There is a disease of apricots, which is known as "Brown Rot", and which is very bad in South Australia. It occurs also in Victoria and Tasmania. It has caused considerable concern to apricot-growers in South Australia, and they asked what could be done about it. The Director of Agriculture in South Australia said, "I can appoint an officer to do this work, but I think that the Council for Scientific and Industrial Research is the proper body to handle it". Therefore, with the agreement of the growers in South Australia, the Director of Agriculture in that State approached the Council for Scientific and Industrial Research and asked us to undertake the work there. The result is that we are engaged in this work jointly with South Australia and Tasmania. The work has only just begun. One of our officers is now visiting the apricot-growing area.

100. *To Senator Nash.*—I am asked whether the Council for Scientific and Industrial Research would be able to investigate a particular disease which occurred in only one State. On principle, it would not. The idea is that the Council for Scientific and Industrial Research undertakes only those problems which overlap State boundaries.

101. *To Mr. Conlan.*—If a State asks the Council for Scientific and Industrial Research to experiment with the control of a disease within its boundaries in order to prevent its spreading to other States, we could engage in the work. The State would invite the Council for Scientific and Industrial Research to undertake the job. We could do it only by invitation.

102. *To Mr. Russell.*—You point out that the altitude of Canberra is approximately 2,000 feet above sea-level, which is higher than the altitude of most wheat-growing areas in Australia, and you ask me whether the Council for Scientific and Industrial Research is experiencing any difficulty, on that account, in its research work

with rust and "take-all". First, I point out that we are not dealing with rust. Dr. Wainhouse is doing that work. The disease called "take-all" occurs in the Australian Capital Territory. It overrides all political boundaries of States, and, consequently, we can study it wherever it occurs. That is what we do.

103. *To Senator O'Sullivan.*—I am asked whether all the members of the staff of the Council for Scientific and Industrial Research are scientists, or whether there are any non-scientists. Quite a number of them are non-scientists. In our set-up, we have research officers, and joined with them are technical officers, who are not so highly trained. Then they must have a number of technical assistants, laboratory assistants, and field assistants and labourers. In order to keep records and correspondence, do the orders and check the stocks of all our valuable scientific material, we must also have a group which can be regarded mainly as clerical. You ask whether there is any administrator who would be superior to sectional administrators such as Dr. Nicholson and myself. There is such an administrator, namely, Dr. Richardson, who is the Chief Executive Officer in Melbourne, and with him, of course, is the council.

You mention that the Queensland Department of Agriculture is experimenting at Townsville with a view to discovering a suitable tropical grass. The State department consults the Council for Scientific and Industrial Research on that work. The officer who was in charge of those experiments has returned, I understand, to England. The State is endeavouring to obtain a suitable pasture for the tropics. We have sought it for years. One of the great problems of the north is the lack of protein in the pastures. We know that in southern Australia subterranean clover has meant an incalculable number of millions of pounds for the manner in which it has improved pastures and increased the nutrition of sheep. There is, as yet, nothing in the north which will do for the area what subterranean clover is doing for the south. We are seeking such a grass. Two plants are offering great promise—one is an annual and one is a perennial. One is the Townsville lucerne, and the other is a perennial *Stylosanthes*. The perennial was brought in about twelve years ago, and is also a kind of lucerne. They come from South America. The point I make is that for years, I have been hoping to be able to send an officer to South America to explore for such plants. As soon as World War II ended, I started my campaign again, but we have been unable to organize it on only a small scale. We learnt that the United States Department of Agriculture proposed to send a man to South America to look for such plants, particularly peanuts for pastures, and other food. We also have been looking for peanuts for pastures, and, in addition, there is *Stylosanthes* and a number of plants which might be of value from fifteen to twenty years hence. As soon as we knew that the United States Department of Agriculture was sending an officer to South America, we thought, "Here is our chance. We shall endeavour to join that expedition, if only we can get things moving fast enough". We were successful. In one month one of my officers was in Brazil. He is in Brazil now with Mr. Stevens, of the United States Department of Agriculture, and they will spend six months in southern Brazil, Uruguay and Argentina looking for the plants to which you referred. If we find only one, it will mean a lot to northern Australia and be well worth the expenditure.

104. *To the Chairman.*—I am asked whether anything has been done regarding pasture improvement in the southern States, except with clover. A great deal has been done in relation to various clovers, and a lot of grasses have been established. There has been a

wonderful development with respect to the use of *Phalaris tuberosa*, and before that, with perennial rye grass and Wimmera rye grass. In addition to subterranean clover, there is white clover and irrigation white clover and, just but far from least, lucerne. So a great deal has been done and is still being done to improve pastures in the south.

105. *To Mr. Hoare.*—Earlier, I referred to the space which was necessary for the quarantining of imported plants. For some of these plants, the period of quarantine would be lengthy. Most of our introductions so far have been grasses and legumes for pasture work. These would constitute by far the great majority of imports, and after that would come cereals and annual fibre crops, and a long way after them anything which could be regarded as a long-term crop. Probably 95 per cent. or 98 per cent. of our introductions have been perennial grasses or legumes which we can watch carefully, and rapidly determine whether they are free from disease and whether they are likely to become a pest crop. So actually our space demands so far have fortunately not been excessive. If we had to deal with fruit trees, the position might become more difficult. What we should have to do in that event would be to reduce the numbers in order not to use too much space.

It is difficult to answer your questions whether suitable men have refused appointment to the Council for Scientific and Industrial Research because of the shortage of houses in Canberra. We do know that some suitable young men from the universities have applied for positions with us, but on learning of the housing situation, have withdrawn their applications and joined the staffs of State Departments of Agriculture. I do not know how many times that has happened, but I can quite understand that it may be quite a big factor. On the other hand, we are fortunate in another respect that our reputation is sufficiently good. I am happy to say, that other men are prepared to undergo that period of difficulty in order to join the Council for Scientific and Industrial Research.

106. *To Senator O'Sullivan.*—Our staff does not consist exclusively of graduates of Australian universities. We welcome any scientists of sufficient repute. You ask me whether, if a scientist is particularly qualified to assist the Council for Scientific and Industrial Research's work, we would endeavour to obtain his services. The answer is, "No, not exactly", but we keep in touch with him and when a certain investigation is proposed, in which he might be interested, he is told about it. It is suggested to him that if he is interested, he should apply. Earlier I referred to a certain Englishman. Here the position is complicated. He was a graduate of an English university. When Dr. Richardson was in England in 1936, he spotted this young man, and asked him what he proposed to do. When the young man was indefinite, Dr. Richardson suggested that he come to Australia. Finally, he did so and worked at the Waite Institute, where Dr. Richardson was then the director. He did a fine job on wheat diseases including "take-all". Indeed, his work was so excellent that he was offered a position at the Rothamsted station in England. At that time, Australia was experiencing the financial and economic depression and it was difficult for him to see where his future lay. Here, he did not have a permanent position. He went to Rothamsted, and his work has fulfilled his earlier promise. He has published a book on his field work, and a number of scientific papers. He is a delightful person. But having lived in Australia once, he desires to return here. Living in England now is not too good. He wonders whether there is an opening for him in Australia. I have had in my mind a position since I gave my evidence in 1930 and I have not been able to find a suitable person for it. This man

is now between 33 and 41 years of age and is in his prime. If we could have him for twenty years, I am sure that he would do a fine job.

107. *To the Chairman.*—I am asked how we disseminate the results of our work among the States, and into the field. This is a problem which we have always to face. First, we have a clear understanding with the State Departments of Agriculture that we shall not engage in any extension work. That is their prerogative. You suggest that we do the work, and they get the credit. We do not mind that. The point is that our job is to do research and publish the results. The first thing we do is to publish the results of our research as soon as we can. We publish them in our journal or in pamphlets or bulletins, which are sent out quite widely to anybody who indicates an interest in that particular field of investigation. That includes the officers of State departments. After that, probably the next way in which our work is disseminated is by personal discussions between our staff, and the staffs of the State departments, or with the man on the land. When we reach the man on the land in this way, it is just in casual or friendly conversation. There is no definite programme. However, we inform our State colleagues as to everything that we are doing. We invite their interest and co-operation. We tell them what our results are. If we consider that some work is so worthwhile that the result should be published as soon as possible, and we know that there is a lag of nine months in printing reports, we set to work and arrange for the reports to be mimeographed or cyclostyled. We make perhaps 200 copies and send them out to our State colleagues showing what we have done and invite them to make use of it. We suggest that they desire to ask any questions about it, they should not hesitate to do so and we will assist them. The last one that we did was in respect of weeds and weed-killers. These results were disseminated in mimeographed form. There has been one change in this arrangement, and that is in New South Wales. Regarding the Murrumbidgee Irrigation Area, we recently reached an agreement with the State Department of Agriculture that we shall co-operate in a seven-year programme of extension work. It has borrowed three of our research officers for seven years to go into its extension field and to tell the horticulturists and rice-growers in the Murrumbidgee Irrigation Area how to handle their soils, &c. That is quite a new departure. We are, in this instance, directly concerned with work in the extension field at the request of the State.

108. *To Mr. McLeod.*—I am asked whether the results of our investigations into the elimination of weeds are available to manufacturers. They are; the manufacturers have already obtained it and are engaged in preparing materials. They are "sitting on our tails" as it were, for results. This is very spectacular. As you are doubtless aware, DDT does not destroy weeds. It destroys insects. The destroyer of weeds is methoxone, of the phenoxyacetic acid group of chemicals, and the results are phenomenal.

109. *To Mr. Conlan.*—The use of methoxone is not detrimental to the ground.

110. *To Mr. McLeod.*—We did not discover methoxone. In 1935, we used indoleacetic acid on fruit cuttings. Some cuttings are difficult to root, and we found that if the acid was diluted to a solution of one part acid and 100,000 parts water, the plants would develop a callus in sand and produce the plants. However, research workers in the United Kingdom and the United States of America discovered during the war that a solution of one part of a similar acid in 1,000 parts water—which was one hundred times stronger than the solution formerly used—was capable of destroying dandelions, plantains, and flat weeds. Experiments showed that when weeds of that

type were sprayed with a solution of the proportions I have mentioned, the weeds made extraordinary growth. However, in the course of this growth, they lost shape and tended to twist in upon themselves. They could not stop growing, but the final result of their distorted growth was that the tissues broke down and the plant died. As a result of such experiments commercial solutions were developed, one of which is "methoxone." To-day it is possible to destroy dandelions, "cat's ear" or clover in a lawn by simply spraying them with a solution of methoxone, and no damage is done to the grass. An extraordinary feature of methoxone is that it is most selective in its action; it does not harm grass roots at all, but in three weeks it completely destroys weeds of the type I have mentioned.

111. *To Mr. Connelan.*—We are at present engaged on experiments to eradicate "nut grass" but methoxone has not been found effective. Some chemicals, principally chloropicrin, have shown encouraging results. Chloropicrin was used to eradicate "nut grass" in some valuable land near Tenterfield where tobacco was being grown. The experiment was quite successful, but it would not be economical or practicable to use chloropicrin for the destruction of "nut grass" on ordinary pasture land. Generally speaking, however, I am confident, because of the experiments already being conducted and the success which has attended most of them, that it will be possible in a few years time to employ particular chemicals for the destruction of particular weeds.

112. *To Mr. McLeod.*—Very successful results have been obtained in the treatment of hoary cress in the Murrumbidgee district in the Wimmera area. These results have been obtained by spraying methoxone in wheat paddocks. By that means it has been possible to obtain 70 per cent. to 80 per cent. control of the hoary cress after twelve months, the wheat yield has been increased by 20 per cent., without any deterioration of the quality of the wheat, and without any harmful residual effect on the soil. Of course, those experiments have been going on for only eighteen months, and it is too soon as yet to make authoritative pronouncements.

113. *To The Chairman.*—We do not concern ourselves with forestry problems except by special request. However, if the Director-General of Timber and Forests requests us to make certain investigations we do so gladly and render every assistance possible. For example, he recently requested us to investigate the cause of "needle fusion" of pine trees—the needles, instead of growing apart from each other were growing together. Our investigation showed that "needle fusion" was caused by faulty nutrition, shortage of superphosphate and other chemicals in the soil where the pines were growing. However, our policy is to concentrate on problems associated with agriculture, rather than silviculture.

I believe that the botanical section of the Council for Scientific and Industrial Research will be of assistance to the botanical and scientific departments of the National University when it is established. I was formerly in charge of a botanical faculty at a university, and I know that if I had had such an organization as the present Plant Industry Division of the Council for Scientific and Industrial Research available in close proximity, I should have made considerable use of its facilities and taken my students to it for practical work.

114. *To Mr. House.*—Efforts made to eradicate grasshoppers by spraying the areas affected from aeroplanes seem to have been fairly successful. However, the eradication of pests such as grasshoppers falls within the purview of Dr. Nicholson. Of my own knowledge, I can say that it has been difficult to

achieve anything in regard to the practical control of grasshoppers. Although Dr. Nicholson and his staff have carried out some excellent research in regard to grasshoppers, their egg-beds and methods of destroying them, the practical difficulties of implementing a scheme seem to have proved too great so far. At the last meeting of the Australian Agricultural Council it was suggested that a joint committee be established, comprising representatives of the Commonwealth, New South Wales, Victoria, and I believe, Queensland, to carry out a concerted scheme for the destruction of grasshoppers. The expenditure involved in the scheme suggested was to be borne by the Commonwealth and States concerned, each contributing a certain percentage. I understand that the grasshopper plague in the Traralgon and Gilgandra districts. However, I have heard nothing further of it, and I do not think the scheme was put into effect.

115. *To Mr. McLeod.*—Aeroplanes were used to spray certain affected areas twelve months ago, and I believe that gamaxane was the chemical used.

The witness withdrew.

Kenneth Henry Oliphant, architect, Canberra, sworn and examined.

116. *To The Chairman.*—I have seen the plans of the proposed building. In many respects it is suitable, but in some other respects I think it could be improved. The plan provides for a square building of considerable size, and the internal lighting presents some difficulties. I do not know how the stairs will be lighted. Even a roof light would not be sufficient to light the lower floors. I have not seen the specifications. There are only three stairways in the whole building—one at each end and one in the middle. That number may be sufficient, but some of the rooms are a considerable distance from the central entrances. In case of fire, the distance may be too great. Another possible weakness is that the entrance to the working units is through the administrative portion of the building and may interrupt the administrative officers. The proposal is for a building of four floors, including a basement. The top floor will contain records, but the only means of getting to it is by means of stairs. There is no provision for a lift. Should there be heavy records, difficulty may be experienced in getting them up and down the stairs. It may be argued that a lift would disturb the administrative officers, but I think that that may be overcome by sound-proofing. A building of U-shape would provide better lighting and also make the installation of lifts easier. I am referring to natural lighting.

117. *To Mr. Connelan.*—I am referring now to the central portion of the proposed building. There is no natural light in the hall. The arrangement of the rooms is a matter for the administration. My only comment on the external appearance of the proposed building is that the central unit lacks strength and character to mix it to the two wings. The central entrance could, perhaps, be altered to advantage. That could be done quite easily.

118. *To The Chairman.*—The connecting links, where the lavatories are situated, need not be of the same height as the rest of the building. The appearance would be improved if they were dropped a little.

Priority in buildings is important. So far, houses of small size have had first priority. That is as it should be. After houses, I think consideration should be given to the provision of facilities for feeding the people. That involves the expansion of existing business premises and the provision of new shopping facilities. Canberra's population has increased considerably since building restrictions were first imposed. Approximately 850 houses have been occupied since 1942. Some

buildings which were previously used for offices are now again used as hotels. No additional shopping facilities have been provided to meet the needs of the larger population. For a considerable time I have been trying to get permits to provide additional shops to supply the public, but without success. As soon as permission is obtained I am ready to go ahead with a number of jobs. Buildings of that kind should be considered when priorities are being determined.

119. *To Mr. Connelan.*—This aspect of building was presented to the Minister at a deputation. He promised to review the situation in three months' time. The time has already passed.

120. *To The Chairman.*—Places in which people have to work must also be considered when fixing priorities. The time has come for a balanced building programme so that all the needs of the community shall be catered for. That raises the question of the building of clubs and recreational buildings. I place, first, the building of homes to shelter the people, next, the erection of shops to supply them with food, and, after that, places in which to work. Office space in Canberra is severely taxed, and therefore any building to accommodate workers has a claim to a priority. A balanced plan is required.

Bricks made in Canberra are unnecessarily strong for the weight they have to carry when used in home construction. The kind of brick used here adds to the cost of laying them. The reason is that they do not absorb water readily, and after a bricklayer has laid a number of courses, he has to wait for the mortar to set, otherwise the weight of the bricks squeezes the mortar out between the courses. In places where bricks are more absorbent bricklayers can carry on without interruption. The extra price charged for Canberra bricks is justified. I do not know how the makers can sell them for the price charged. I have found it studied this question recently and I have found it impossible to compete with the existing prices charged for bricks unless a certain type of kiln was used.

At present, roofing materials, particularly tiles, are in such short supply that a bottleneck exists. That position will eventually improve. At the moment, the position in regard to timber is fairly satisfactory, due largely to the delays caused by shortages of roofing materials. I fear, however, that there will be a shortage of suitable timber for some years. Finishing age of suitable timber for some years. Finishing timbers are hard to obtain. There are sawmills in the district which provide hardwoods. The proposed building will not require roofing tiles and, therefore, will not interfere with the housing programme in that respect. There are plentiful supplies of cement throughout Australia, although at times supplies have been difficult to obtain. I have no large buildings in course of construction at present. I am restricted to small houses. I have in hand about 100 houses in small houses. I have in hand about 100 houses in small houses. I have in hand about 100 houses in small houses.

In my opinion, the estimate of £50,400 for the proposed building exclusive of services, is high. Indeed, the total estimated cost of £73,358, including £21,853 for services, is, in my opinion, very high. A building of this kind is different from a number of separate cottages, because the gang on the job will be all together. Moreover, the cost becomes less as the building rises in height.

121. *To Mr. Connelan.*—Contractors are hesitant about submitting firm tenders. Generally, contractors add an extra amount to cover contingencies.

122. *To The Chairman.*—The chief factor in increased building costs is the diminished labour output. Men are not any weaker than they were before the war, but they are not doing as much work. For instance, it was not unusual for a bricklayer to lay 1,000 bricks

in a day before the war; now the output is about 300 bricks a day. Before the war a man would hang twelve doors a day; to-day he will hang only four doors.

123. *To Senator Nash.*—I think that skilled tradesmen to-day are much the same as before the war. In my opinion, the trouble is that many men have lost their keenness for their work. Life to-day is more endurable but not more enjoyable. There is not the same pride in doing a job in the afternoon practice of never visiting a job in the afternoon because, if I do, I am pestered by men asking me the time. I do not blame them. They could do the work if they had a greater incentive. Some men find that incentive by working at week-ends. On week-end jobs they lay more bricks than on regular working days during the week. Many men lay as many as 800 bricks a day at the week-end.

124. *To Mr. Connelan.*—It is not my policy to ask a man to work at week-ends. I believe that that is the time when he should enjoy some relaxation.

125. *To Senator Nash.*—Some builders have told me that men who work at week-ends are too tired on Monday to do their work.

126. *To The Chairman.*—I would not say that the reason is that there was a loss of skill during the depression years. Early in life I learnt that a man who is skilled in the use of tools is less tired at the end of a day's work than a man less skilled. I have in mind a young man who came out of the army. I persuaded him to continue in his old job for a time so that he could become acquainted with the changed conditions since the war began. He is now in business on his own and is doing good work. He needed some incentive.

127. *To Senator Nash.*—He employs a limited quantity of labour. He has his own team of men. They are laying many more bricks than 300 a day. They have been inspired by their employer.

128. *To Mr. Connelan.*—I do not know the percentage of trainees from Britain who are engaged in the building trade in Canberra, but I should say it is well below 90 per cent. of the total. I fear that some trainees in the industry are losing heart.

129. *To Mr. Russell.*—I do not know even approximately the number of men engaged in the building trade in Canberra.

130. *To The Chairman.*—Before the war, building costs in Canberra were higher than in Sydney, but to-day they are about the same in both places.

131. *To Mr. Connelan.*—I know Mr. Warren MacDonald, but I do not know the nature of the work upon which he is at present engaged. I believe that one of his proposals was that builders should be registered.

132. *To Mr. McLeod.*—Nowadays, concrete is always mixed on the job by machines, but it still has to be wheeled in a barrow to foundation trenches or to the hoist for carrying it to various parts of a building. Foundations are generally excavated by machinery on comparatively big jobs, because that saves money. On smaller buildings, however, it is not always practicable to use excavating machinery because it tends to damage work already done. The cost of erecting prefabricated buildings seems to be at present a little higher than the cost of erecting buildings in the normal way. That, however, may be due to the fact that this method of building is in its initial stage.

133. *To The Chairman.*—New South Wales hardwood used on local jobs does not get much chance to wood. In most places it is kiln-dried. Hardwood is quite a satisfactory timber provided it is securely

fixed. It is of no use skew-nailing it, because it will pull out the nails as it dries, but if it is securely fastened it will dry in the right position. One can generally reckon on timber being a little wet to-day when it is supplied. At one time I would not use anything but Oregon for roofing, but now we have to use hardwood. The pine grown in the Territory is all right for battens and flooring, but it is very soft. However, it has largely replaced imported pine, and is slightly cheaper than hardwood. Cement tiles have been used a little in Canberra, but so far only hand-made cement tiles have been available. In order to get the best results they should be made by machinery so that they can be pressed sufficiently. They are no cheaper than terra cotta tiles, but they are being used because they are the only kind available, and it is necessary to get the roofs covered. They are fixed in the same way as terra cotta tiles.

134. *To Mr. Howse.*—I agree that the present low labour output in the building industry may be in part due to a "hang-over" from the war. I remember that when I came back from the 1914-1918 war I had no wish to settle down to work until after I had had a good holiday of some months' duration. Unfortunately, at the present time, a good deal of trained labour has been diverted from the building industry. For instance, I know of some very good bricklayers who have taken on jobs serving in shops, while others have become railway porters.

135. *To Mr. Conelan.*—In some instances they give up the building trade because their wives do not like them coming home with grubby clothes. As a general thing, however, one may say that those who give it up have not their hearts in the job.

136. *To Mr. Howse.*—Building trainees receive six months' training, and at the end of that time some of them are quite good. Others, of course, are of little use, and are not worth having.

137. *To Senator O'Sullivan.*—The men tell me that they do not want to earn any more because they would then have to pay too much in taxation. I recognize, of course, that this factor is not so important now as it was during the war.

138. *To Senator Nash.*—The regular builders will not employ men on Saturdays as a rule. If they are employed on Saturdays on the new guest house near the Hotel Kurrajong they are being paid penalty rates.

139. *To Senator O'Sullivan.*—Bricklayers are paid about £8 10s. a week, and if they receive a living-away allowance their total earnings amount to about £10 a week.

140. *To Senator Nash.*—I have made a study of the average time lost by building tradesmen due to weather conditions. I should say that a bricklayer in Canberra will not get more than 10 weeks work out of the 52. At the present time, there is also some loss of time due to failure to supply material, but the men are often able to pick this up on what we call "australian" jobs, that is, small jobs valued at less than £100, to which we can divert men while waiting for materials to arrive on the bigger job. I am able to employ men in that way because I generally have a number of such jobs on hand, but the builder who has only one big job going, would have to stand his men down if supplies of materials were not forthcoming. I said in my evidence that, because of the hardness of Canberra bricks, which tended to make them non-absorbent, only four courses of bricks could be laid with safety; otherwise the weight of bricks would squeeze the mortar out from between the two lower courses. In an ordinary cottage wall there would be about 1,500 bricks in four courses and, with two bricklayers working, a day's work would represent 750 bricks each. At the present time, however, they are laying only about 300 bricks a day each.

A contractor who wanted to get the full 1,500 bricks laid in a day would have to put more than two bricklayers on. The supply of bricks in Canberra would be sufficient for this proposed building, and for other requirements, provided the housing programme did not greatly increase. I do not think that the stairway accommodation is quite sufficient in the proposed building to provide against fire risks. I would prefer to see an additional stairway provided. I do not know whether the plans have been submitted to any authority in Canberra with a view to seeing whether safety conditions have been complied with. Ordinarily, government buildings are not submitted for such approval. The estimated cost of this building is £73,000. A contractor ordinarily allows himself a profit margin of 10 per cent., but on a building of this kind he might even come down to 5 per cent., but more probably to 7½ per cent. I have myself accepted tenders on a cost, plus a fixed-fee basis, with a bonus if the costs were kept below a stipulated figure. Generally speaking, I do not like the cost-plus system, because it is open to abuse, but the provisions which I have just mentioned constitute some safeguard. I would not say that this building could be erected economically by day labour, but I do not see what other way there is of doing it. It will be difficult to obtain tenders for the job. In normal times, I think it is very much better to have buildings erected by contract. It is more satisfactory to make the man who is responsible for the job responsible also for keeping down the cost.

141. *To Mr. McLeod.*—It is a little more difficult, if anything, to get tenders now than twelve months ago. Contractors allow a big margin for contingencies now because of the risk of not being able to get material. One of the reasons for the slowing down of the labour on building jobs is that the general atmosphere prevailing to-day makes for that sort of thing. I agree, however, that the fact that the supply of materials is intermittent tends to make men go slow on the job, because it is of no use for them to lay all the bricks available in a few days and then be stood down for the rest of the week because no more bricks can be obtained. Our biggest problem is the supply of materials. When that is solved our labour difficulties will sort themselves out.

142. *To Mr. Conelan.*—I regard the plan of this building as quite satisfactory, with the exception of two or three points. I think that provision should have been made for a lift. Perhaps it was omitted from the plan because it was desired to avoid noise; but, generally speaking, a lift is needed in a building of more than two floors. I also believe that the lighting of the stairways could have been improved by carrying the corridor right to the back of the building. The only other way would have been to design a U-shaped building. I agree that building costs are tending to increase, but I would not say that the Government was wasting its time and money by employing Mr. Warren MacDonald. It takes some time to produce results, and I do not know in what way Mr. MacDonald is attacking the problem. From reports which I have received, the output per man in the building trade is not peculiar to the Australian Capital Territory, but is fairly general. In reply to your question, I would not say that the estimated cost of this building will be known to outside tenderers. In any event, the price will be governed in this case by the set of quantities. On a small house, that would not be so, but on a building of this size, it would apply. For a building costing more than £5,000 a set of quantities must be prepared. The quantity surveyor can always check the figures, so there would not be any need to worry about that.

All building materials which enter the Australian Capital Territory are allocated on a priority basis. Unless I give my permit number, I am not able to

obtain any materials from any supplier. Of course, the Government has priority on bricks and local timber. Some time ago, we had difficulty with the supply of bricks, but the lag has been overtaken. In addition, a good deal of the lag has been picked up with timber, except that I am not able to purchase milled timber, such as flooring, unless I plead very hard for it. This is all run for government construction, and I have to obtain supplies elsewhere as best I can.

I obtain my workmen mainly from among men who live in Canberra and Queanbeyan. Occasionally one of them is a tradesman from overseas, such as a painter. You ask me whether workmen give the same output on a government job as they do on a private job. In my opinion they do, except in one instance which I mentioned.

143. *To the Chairman.*—You suggest that there is too much similarity about the front elevation of the building and ask whether an appropriate design could be obtained, more in keeping with the conditions of Canberra. I agree that it is slightly monotonous, but the lowering of the wings and the different type of treatment of windows would help to build up the whole scheme. The fenestration of this area could be changed a little to indicate that it is the administrative section and not the actual plant industry and entomological sections. The entrance door might also be emphasized a little, but that is really a matter of opinion.

144. *To Mr. Russell.*—I do not think that you would gain anything by releasing the estimated cost of the building to the public. In a way it would probably be wiser not to release the information. We are dealing only with sketch plans and preliminary estimates. When the final drawings are done, you might make some reductions or additions. People do not often give much consideration to estimates. It will only be the public who will say that so much is being expended on the Council for Scientific and Industrial Research. The builder himself does not take much notice of that. He gets the plans and specifications and quantities and goes into those matters very carefully. Earlier in my evidence I set out my views regarding staircases for the building. I am not in a position to estimate the number of houses which are now required in Canberra. I have approximately 100 houses to build privately, but that is apart from the enormous number that the department has to build.

The witness withdrew.

David Edward Limburg, sworn and examined.

145. *To the Chairman.*—I am Assistant-Director of Works, Department of Works and Housing. I have prepared a very brief statement which begins really from the point where Mr. Phillips, our Director of Architecture, left off. The statement reads—

This building will be the connecting link between the two existing buildings comprising Divisions of Entomology and Plant Industry, and will complete this group. This group comprises one connecting link. I have been asked by the Council for Scientific and Industrial Research to prepare requirements as planned by the Federal Capital Commission and illustrated in general outline only by perspective sketch herewith.

This sketch will give you a good general impression of the whole scheme. It shows the existing buildings and the new connecting link. At present, the two buildings standing there do not give any impression of unity or balance and one is apt to feel that they are off centre. My statement continues—

It will be seen from this sketch that the ultimate central block for the Council for Scientific and Industrial Research will be sited on the axis of University Avenue with balancing groups—of which this present group is one—on either side.

The details of construction of the building, accommodation provided for and mechanical equipment have been covered in previous evidence by the Director of Architecture of this department, Mr. Phillips.

Materials.—The materials used in construction have largely been decided having regard to restriction in use of materials used for housing purposes.

The bulk of the work will comprise the following materials:—Cement, steel reinforcement, aggregate, sand, bricks, terra-cotta lumber blocks, steel windows, steel roof trusses, roofing, plumbing materials including those required for air-conditioning, air-conditioning equipment, fibre board, and linoleum.

Of these materials difficulty can be anticipated with regard to the following:—Steel reinforcement, roofing, steel roof trusses, plumbing materials, air conditioning equipment, and linoleum, but it is anticipated that these difficulties can be overcome by early placement of orders, and to some extent shortages can be overcome by substitution of sizes and in some cases of materials themselves.

The timber requirements are small and will not present any difficulties. It is probable there will be some delay in completion of air-conditioning equipment.

The use of the following materials may have some effect on the housing requirements dependent upon the actual supply position from time to time:—Steel reinforcement and plumbing materials.

Bricks.—It is anticipated that there will be any difficulty in the supply of bricks, as at present a reserve stock of approximately 800,000 bricks is held and production exceeds present demands. It is anticipated, however, that with a fully expanded programme that the full brick output will eventually be absorbed. In addition, a new concrete block machine has been ordered, which will have an output equivalent to 200,000 bricks per month.

Labour.—The construction of this building will of necessity have some effect on the labour required for the construction of houses, but only to a minor degree. In the early stages it will comprise largely excavation and concrete work. It is anticipated that a building of this nature will possibly attract a building organization from outside the Australian Capital Territory which, when this building is complete, would probably be available for housing construction.

In reply to your question, "aggregate" is the metal required for concrete—crushed stone. The aggregate and sand, together with bricks, all are local products and there is no difficulty about supplies. Our head office prepared these plans. I have no idea of the cost of the two existing buildings. Brickworks in the Australian Capital Territory are supplying bricks for housing projects in Queanbeyan but are restricting the supply of bricks to outside interests entirely to housing requirements. That applies also to the Australian Capital Territory.

146. *To Mr. Conelan.*—Our brickworks are supplying bricks to the New South Wales Government for the construction of twenty houses in Queanbeyan. We are not supplying bricks for commercial buildings, but we are supplying them for the Queanbeyan Hospital. We have not arranged to supply any bricks to Cooma.

147. *To the Chairman.*—You mention that cement tiles are being manufactured in the Australian Capital Territory, and ask whether they are satisfactory. I cannot say that from our experience to date they have been very satisfactory. They are manufactured on hand machines, and the makers are experiencing some difficulty in getting the right type of labour for the work. We have had a good few cement tiles which were satisfactory but others have not been so. I understand that the Government is not considering manufacturing cement tiles. The firm which is manufacturing them by hand proposes to install mechanical plants. Although we believed that the plant might have been in operation as early as last February, it is still not yet complete, and latest advice states that it will be making tiles about the end of January. This is a big plant and will operate at the rate of three roofs a day, which is equivalent to about 750 a year. That is a big programme. The roofing position is now our worst problem. It is very largely affecting the whole programme and we are using every

possible substitute in an endeavour to meet the position. I consider that the mechanical equipment will produce a sufficient number of cement tiles for the programme.

Another item of building material now in short supply is steel, but we are managing to get by with it. It is hard to say that any materials other than bricks are not in difficult supply, but by sustained effort and special lines of attack we manage to keep things moving.

143. *To Mr. Connelan.*—Cement has never actually held us up. There have been periods when supplies of cement have become critical, due really to strikes, but at present the position is quite healthy, at least in the Australian Capital Territory.

149. *To the Chairman.*—You ask me whether the construction of this building will hamper the housing programme, and whether the work is justified at present. The justification is hardly a matter on which I am able to comment. As Mr. Connelan says, it is a matter for the Minister. We have pressure, of course, from all sorts of quarters to undertake building programmes which we might feel are not essential, but there are other aspects which might be considered in relation to them. Whilst the emphasis is on housing and we feel that we must strive to our utmost to meet the housing position, we realize at the same time that it is necessary to have some balance of construction. Otherwise, suppose five or six years hence we did overtake the housing position, we would have a similar position in another phase of activity. If we work on a balanced programme, we shall ultimately more quickly attain to a complete result.

I am asked whether the front elevation of the building could be varied in order to make it a little less monotonous. This building has been developed over a period of years. There were earlier designs on rather different lines. I think that the two connecting links were a story lower, and the centre portion was broken up more. The front line of the building is not in one plane. The final design was decided at our head office in Melbourne. The perspective gives the best impression of the whole thing. The front flat elevation does not give a proper impression. You suggest that, when viewed from the front, the building looks a little monotonous, but when viewed from a side it does not convey that impression. A front elevation like that would not give you a factual view of it. Even if you look directly at it, you would still get the diminishing lines and light and shade which would give the impression of general massing.

150. *To Senator Nash.*—As you suggest, the proposed plan is prepared with a view to synchronizing with the rest of the building. The existing building did more or less decide the type of treatment of the central portion. In the completed scheme, we would not want the two side groups to unbalance the whole effect. The completed building scheme has a dominating central feature, and this group is one of the wings building up to it.

151. *To the Chairman.*—The main building will be the main administrative block in the centre when the whole project is completed. This project has been referred to as the administrative block but it is not the administrative block for the Council for Scientific and Industrial Research. It is only the administrative block for these two groups of buildings.

I am asked whether terrazzo is more durable than timber for the entrance hall and whether I consider that terrazzo would be more satisfactory in this instance. I believe that it would be more durable although a selected hardwood such as jarrah or tallowwood would be quite serviceable.

152. *To Mr. Connelan.*—You suggest that terrazzo would have a better appearance and would not interfere with the housing programme. There may be something in that suggestion although we do use terrazzo for sink-drainers and the like, and our local production is strained on occasions to meet the position.

153. *To the Chairman.*—I am asked what arrangements we make for the supervision of properties and the like when the building is being constructed. We would have it very closely supervised by a works supervisor. I am not sure that he would be there all the time, but he would spend a lot of his time there, and there would also be over-riding supervision by a supervising architect. The question of checking quantities would be taken up in connexion with the progress payments. All progress payments on a job of this nature, where we have a bill of quantities, are done on a check of actual quantities and materials put into the job. You suggest that it is essential on a big job of this nature to have a clerk of works on the spot all the time. It may be desirable but it depends entirely on how quickly the work progresses and just what degree of supervision is necessary from time to time. As Mr. Connelan suggests, this depends to a degree upon the honesty of the contractor, but I would say that the determining factor would be the progress of the work. Otherwise, we might have a man just standing around half the time. You state that that would be better than wasting thousands of pounds, through lack of supervision, on work like the concrete foundations for the administrative block. I am hardly competent to comment on that, but in regard to concrete or any hidden work, we would invariably have a man on the job the whole time. There would not be anything go into the job which was not seen.

You mention that Dr. Dickson stated that difficulty was being experienced with the steel windows in the Council for Scientific and Industrial Research building because they were leaking at the bottom. I am familiar with the complaint, and, before commenting on it, I would have to see exactly what the trouble is, but steel windows certainly do not leak if they are properly installed. They can give trouble if the damp coursing around the windows is not entirely satisfactory. Steel windows are a fairly thin section and when built into a cavity wall where the cavity may be a couple of inches wide and the steel frame about an inch, the brick sits either side of the frame come fairly closely together and mortar droppings can easily cross the cavity. For that reason care is necessary to see that there is a proper dampcourse. If the window is properly installed there should not be any trouble.

We may have every difficulty in securing tenders for the job. In recent times, our experience with tenders has not been very happy. On bigger buildings of this nature, we have a better opportunity to obtain tenders than on houses. We are having extreme difficulty in obtaining competitive tenders for housing. Many of the bigger firms are looking for work of this nature rather than housing, because housing is so exacting in detail in every way. You ask me whether we find that the tenders are within the departmental estimate. To-day, estimating is most difficult. We have rising costs on every hand. In general, when times are more normal I would answer "Yes" to that question.

154. *To Mr. Connelan.*—I am asked whether I consider that the price for this building is reasonable. The price has been worked out carefully having regard to all present day conditions. We do not think that any prices to-day are reasonable. We feel that the estimate is reasonable in view of present day conditions.

155. *To Senator Nash.*—As Assistant Director of Works, I do on occasions come into close contact with the men working on the job. This depends entirely

upon the pressure of work. I have not been so closely in touch with them in recent times as I might. It is not my usual function to come into direct contact with them. It only occurs when I go out deliberately into the field to make a personal contact, or when a complaint has been made. I have some knowledge of the average type of building workers in the building industry to-day. With regard to present day output of labour the easiest trade to check is bricklaying. The average number of bricks which are laid at present ranges from between 350 to 300 per man. That output would be fairly uniform. Several factors account for the low output; one is that a large number of trainees is employed, and another is the disturbed state of mind of some bricklayers because of the controversy associated with the payment of "country allowance".

156. *To Mr. Connelan.*—Men who reside over 40 miles from Canberra are paid country allowance of 32s. 6d. a week, which coincides with the rate charged for accommodation in our workmen's hostels. Wages paid to bricklayers approximate £3 a week for a week of five days. Men who are not paid country allowance feel that those who are should do more work than they themselves do. Further, some bricklayers who have come to Canberra for employment have probably come here because they were not doing as well as other bricklayers in the cities and other places. Generally speaking, they are not as efficient as the local tradesmen. Although some controversy exists between the men concerning the payment of the allowance, the fact remains that we should not be able to obtain labour required without payment of country allowance.

157. *To Senator Nash.*—I am unable to give you any idea of the average number of bricks laid per man in 1930, but I imagine that it was much higher than the present output. Another factor making for low output is that during the war many men were transferred to trades for which they were not trained and for which they had no particular liking. That applies particularly to carpenters, but not so much to bricklayers. As an example, during the war any one who could use a hammer was employed as a carpenter. In regard to the question whether much working time is lost in Canberra because of weather conditions, there is little lost time through wet weather. The main effect which the weather has on building tradesmen here occurs in the winter time. Bricklayers, and particularly those working on high levels, feel the impact of frosty conditions rather keenly on winter mornings and their output suffers somewhat in consequence. Some time is also lost through shortage of materials, but the department has made a special effort to overcome that. Instructions are that as soon as a shortage appears likely to hold up progress, it is to be reported at once. Furthermore, we have established a Materials Procurement Section to obtain materials in short supply, and we endeavour as far as possible to line up all the materials required before a job is commenced, but unfortunately, we have never been able to achieve this because of the operation of unforeseeable factors such as strikes and other dislocations. I am asked whether, if sufficient materials were on hand, enough labour would be available to complete this work on a day labour basis. That question requires serious consideration. The present day labour organization is equipped for house construction and additional gear would be required for a building of this nature. On the basis of pre-war rates of construction one year would be required to complete the job, whereas under present conditions, two years would be required. The longer period is not occasioned solely by reduced output of labour; many other factors operate to prolong the time of completion of any large building job to-day. An average number of 40 men would be employed throughout that period. Apart from the construction of houses

we do not undertake work on a day labour basis at present. I have not had an opportunity to give any serious consideration to the availability of the necessary labour.

158. *To Mr. Russell.*—From the time a contract is accepted for this work, I should think that possibly three months would elapse before bricklayers were employed, and at the height of operations I think that about twenty bricklayers would be needed. When I referred earlier in my evidence to the difficulty of obtaining contractors for large jobs, I had in mind large-scale housing projects. Possibly the reason why local contractors do not wish to undertake works of that kind is that they are already occupied to the limit of their capacity, whilst master builders elsewhere are unwilling to come to Canberra to construct houses. Serious difficulties confront every one concerned with building to-day, including contractors, and contracts for large works involve considerable hazards. However, the construction of such a building as that at present proposed would not present quite the same difficulties as other large works because it is to be mainly a brick and concrete structure. In regard to the matter of supplies of building materials, the position so far as cement and bricks is concerned is quite satisfactory, but there has been no improvement whatever in the supply of tiles. No more tiles are available than was the case twelve months ago. Furthermore, our supplies in the Australian Capital Territory have been prejudiced by the attitude adopted by State authorities who control the distribution of tiles. They have not assisted us at all, probably because they have their own difficulties to contend with.

159. *To Senator O'Sullivan.*—Although I have been in Canberra for fifteen months, the department has not carried out any large buildings on day labour during that time. Of course, some large constructions were undertaken in Canberra in previous years on the day-labour system. Parliament House and the Hotel Acton were constructed by day labour. In reply to your question as to whether it costs more to build by adopting the system of day labour than by letting contracts, the experience of the department is that it is very difficult to "improve" on the prices quoted by contractors, although the construction of works by contract sometimes proves more costly than it would by day labour. We certainly find it more easy to get work done by day labour. Construction of houses which are being erected by day labour is far ahead of those which are being erected by contract.

160. *To the Chairman.*—You have informed me that Mr. Oliphant said that the extension of the main corridor to the rear would result in more natural light for the central staircase. My reply is that any such extension would affect the whole plan of the building. It would cut this section (indicating on plan) in two. The lighting is intended to be provided under this plan from the large skylight, down the staircase, and I believe that it would be sufficient. From the point of view of planning such a building, extension of the corridor would be a serious disability. We always strive to conserve natural light for the areas of the building in which work is to be carried out, and for that reason, staircases, lift wells, and so on, are not so important. With regard to the suggestion made to me that, in view of possible fire risk, another staircase should be provided, I am of the opinion that sufficient provision is made in the present plan to overcome that risk. Staircases are provided in the centre and at each end of the building.

161. *To Mr. Russell.*—No occupant of the building would be very far from a staircase at any time, even if he were in the centre of the building. For that reason I do not believe that the fire risk constitutes a real problem in this case.

162. *To the Chairman.*—It would be practicable to provide an outside elevator to carry stores from the stack room to the top floor to overcome the necessity for carrying stores up the stairs, but, as far as that is concerned, an internal elevator could be provided. I had not consulted the officers of the Council for Scientific and Industrial Research in regard to this matter, but the provision of an elevator, if one be desired, should not present any difficulty.

163. *To Senator Nash.*—Although the building comprises four floors, any one who wished to reach the top floor from the ground level would only have to walk up two floors. However, I agree that any one working in the "constant temperature" rooms would have to walk up three floors if he required to visit the top floor. On the other hand, I understand that very few people will require to go from the constant temperature rooms to the top floor. Although I agree that it might be desirable to consult Dr. Dickson, the Director of the Plant Division of the Council for Scientific and Industrial Research, in regard to the provision of such matters as elevators in the building, I imagine that matters of that kind were discussed fully before the plans were drawn.

164. *To Mr. McLeod.*—The provision of an elevator would not interfere with the present plan greatly; as a matter of fact, provision was made in an earlier design for the inclusion of an elevator, and I do not know the reason for its omission in the present plan.

165. *To Mr. Howse.*—In regard to your suggestion that the appearance of the building might be enhanced by breaking the line of the front elevation by erecting two or three columns, I think that the treatment of the front porch, which provides that the wings of the porch are to stand out some three feet on either side, terminating in a wrought iron balustrade, already achieves a similar effect. Furthermore, the trim around the windows is to be of heavily molded freestone, which will give a very strong emphasis to the front openings.

166. *To the Chairman.*—I am asked whether, in the event of no satisfactory tender being accepted for the construction of the work, that it should be entrusted to a builder on a basis of cost, plus a fixed fee, plus a bonus for savings effected. I think that we could enter into a contract on a basis of cost, plus fixed fee. We have had some experience of that type of contract, but we have never considered the idea of paying a bonus for savings effected. There is always the possibility that a contractor might seek to skim on materials, but supervision of the construction would be in the department's hands, and that would safeguard the position. With regard to the material proposed to be employed in construction of the roof, namely, corrugated asbestos cement, there may be some difficulty in obtaining sufficient supplies. However, I believe that a satisfactory substitute could be obtained. Although you suggest that asbestos is not a satisfactory material to be used in roof construction because of its fragility, I do not agree with your contention. Although it is fragile, it has to be struck with some heavy object before it breaks. In any case, we have used it on many important buildings and have found it quite satisfactory.

The witness withdrew.

(Taken at Canberra.)

WEDNESDAY, 3RD DECEMBER, 1947.

Present:

Senator LAMP (Chairman).

Senator Nash.	Mr. McLeod.
Senator O'Sullivan.	Mr. Rankin.
Mr. Connelan.	Mr. Russell.
Mr. Howse.	

Francis Somes, executive officer of the Building Workers Industrial Union, vice-president of the Trades and Labour Council, Canberra, and vice-president of the Australian Labour party, Canberra branch, bricklayer, sworn and examined.

167. *To the Chairman.*—I am familiar with the conditions under which bricklayers work in Canberra. All bricklayers are kept fully employed in Canberra at the present time. No time is lost because of bad weather as, for the past fifteen months, or thereabouts, the men have worked under a weekly hiring arrangement. Prior to that, owing to some mistake in the clause relating to wet weather, the award was not properly carried out. The anomaly resulting from that mistake was rectified and we now start on Monday and finish on Friday. Both employers and employees have to give a week's notice of termination of services. Work is frequently held up because of shortages of materials, not of bricks, but principally of frames, especially on government day-labour projects. Those hold-ups cause a very great slowing down of the jobs. About three or four months ago, on a day-labour project at Narrabundah, from eighteen to twenty-two tradesmen were walking around waiting for work. That is one of the big drawbacks to the speedy implementation of the housing scheme. Some of the men were shifted from Narrabundah to O'Connor. On jobs carried out by private enterprise here, arrangements are usually made for the timber frames to be ahead of the work. If, for any reason, a hold-up occurs in the supplies of these frames, the contractor usually arranges with another builder to take on his men on loan until such times as the frames arrive. An instance of that is occurring now on a job being done by Simmie and Company Proprietary Limited. The men on Simmie's job are temporarily working for another builder named Chapman on a loan arrangement.

168. *To Senator Nash.*—The cause of the delay on the government day-labour job to which I have referred was due principally to inefficiency at the Acton offices. It was not due so much to shortages of materials as to the failure of the Department of Works and Housing to utilize the services of the men in the best possible way. There were 30-odd cottages in the last job. When the foundations of these had been completed and the walls taken to a height at which insertion of the frames became necessary, the men should have been shifted to other jobs, but that was not done for some time. When Mr. Lazzarini was Minister for Works and Housing, the Trades and Labour Council put up a case for the construction by day labour of nine or thirteen cottages at Narrabundah and twenty-odd cottages at Ainslie. Mr. Lazzarini sanctioned the adoption of that method of construction for those houses. That was more or less in the nature of an experiment, and the Trades and Labour Council was to be told, when the jobs were completed, whether or not that method had been successful, and if it did not prove successful where the men had fallen down on the job. The whole of the costs were to be itemized, and the Trades and Labour Council could say to the bricklayers, "It is up to you to make a job of this if you want the day-labour system adopted in Canberra." To any man not doing his job the Trades and Labour Council could say, "This is up to you. If you do not make a job of it, you will be the one to lose the good conditions associated with day-labour work." Mr. Lazzarini, however, lost the portfolio of Minister for Works and Housing and, under the new Government, Mr. Lemmon assumed that office. I have had three or four conferences with the Works Director, Mr. Potts, and Mr. Phillips, who was Acting Works Director before him, in which I submitted to them my ideas for reducing building costs;

but they did not seem to agree with them. Now, however, twelve months afterwards, suggestions which I then made are being incorporated in the jobs.

169. *To the Chairman.*—I would not go so far as to say that the inefficiency at the Acton offices is due to lack of staff. The cottages erected by Mr. Toy at O'Connor were scheduled to be constructed by day labour, but the department was unable to provide an efficient foreman to look after them and the contract was let to Toy. The Government prime costed the items and sold the frames to Toy. The sizes of the frames are pretty well standardized. As we were stuck for frames at Narrabundah, Mr. Limberg went to Sydney and bought steel frames.

When the Englishmen came here last January, the department was not ready to employ them fully and we had as many as 22 bricklayers working on one cottage job. That was most uneconomic. A gang of five men is ample for efficient brickwork on a cottage. If the gang consists of more than five men, the men get in each other's way. Imagine 22 men working on a cottage the floor area of which is not very much greater than the room in which we are now sitting! The employment of a greater number of men on the job makes for inefficiency all round. The Englishmen had to become acclimatized. When they arrived it was hot and the least affected them. The cost of a couple of cottages on which they were employed was terrific.

170. *To Mr. Connelan.*—They were classed as tradesmen. They came out here with union qualifications from England. They belonged to the unions there. The Building Workers Industrial Union spoke to Mr. Calwell about the matter. Mr. Calwell arranged for a conference to be held at the old hospital building, but instead of him or Mr. Dedman being present, the union officials met only representatives of the Ministers. We tried to arrive at a suitable basis upon which the trainees under the Commonwealth reconstruction training scheme could be trained here. We said, "Why bring the Englishmen out here; why not use our own ex-servicemen?" Mr. Limberg, who was acting for the Department of Works and Housing, said that the department would dictate who should come here, and not the union. We agreed that the department had the right to do so, but we contended that if the day-labour system were to be adopted on a proper basis the union should have some say in its operation.

The number of bricks laid by bricklayers employed on day-labour jobs at Narrabundah has varied. In the early stages of construction we were laying over 400 bricks a day. The trainees under the Commonwealth reconstruction training scheme began work in January or February. I was employed there in April. In the following January the Englishmen came here. We went through a bad winter and the average dropped to approximately 350 bricks a day. When the Englishmen came our figures went flat. After that they started to rise again. When the change-over came there were about five of us left there and we were laying about 500 or 600 bricks a day. The bricks then were approximately £4 a thousand.

171. *To Mr. Howse.*—That was about three or four months ago, or perhaps a little longer. That could be easily checked by investigating the figures relating to the Narrabundah day-labour project. I was then working as a shop steward. When Mr. Oliphant gave his evidence he did not appear to know that the average figures relating to the laying of bricks applied to the work of all concerned, including skilled bricklayers, the English tradesmen, the apprentices and the trainees under the Commonwealth reconstruction training scheme. The average figure did not represent the average output of a skilled worker.

172. *To Mr. Connelan.*—Before the war I worked for two piece workers in Canberra. We had a very good hod-carrier. One wet day, while sheltering from the rain, we had a debate about how many bricks we were laying. We examined the brick tickets for eleven months and arrived at an average of 600 bricks a day for each man. There were three bricklayers employed on the job.

173. *To Senator Nash.*—They were all competent bricklayers, and this was at a time when bricklayers were walking around looking for jobs.

174. *To Mr. Connelan.*—On the job on which I was working at Narrabundah there were five men employed and we were laying about 500 bricks a day. That would work out at something like £4 a thousand. We were a small gang and doing a small job. If you were working on the construction of, say, twenty or 30 cottages, you could spread the men economically, provided you could obtain satisfactory labourers. The shortage of suitable labourers is the crux of the building position to-day. To-day, there is no piece-work but work is let out to sub-contractors. Persons may register here as sub-contractors. I have read the report of Mr. Oliphant's evidence and I am amazed at its inaccuracy. Mr. McPhail, who is perhaps the fastest bricklayer in Canberra, cannot lay bricks at the rate of 1,000 a day, and he is an exceptionally good tradesman. That man, unfortunately, is being wasted. He is carrying a hod because he cannot get a hod-carrier. Other good men are also carrying a hod for the same reason. Thus, competent bricklayers are wasting their time doing labourers' work.

175. *To Mr. Russell.*—The result of the shortage of builders' labourers is that good bricklayers are not fully availed of. A good worker establishes a very desirable environment for those who work with him. The pace-maker establishes the pace, even though he may not deliberately do so. If a man is working on a job which is constantly held up for one reason or other, he is given no incentive to do his best. It is not unnatural for him to think that if he goes along at a reasonable pace, he will be out of bricks or his labourer will not be able to keep up with him. In that way the speed of a job steadily declines. The trainees under the Commonwealth reconstruction training scheme say that they will lay only 300 bricks a day. I do not know where they get that idea from. Some people say that it is the union which fixes the rate at which bricks are laid. In all my experience of the union, I have never yet heard any union official say what the rate should be. Here, in Canberra, members of the Trades and Labour Council are working flat out to make the day-labour system pay. That activity is noticeable right throughout the country. However, some people seem to be intent on crushing that system. When a bricklayer is working for a builder and supplies are held up, he goes straight to the builder and tells him what is happening. Under the day-labour system, however, the position is entirely different. If construction was held up for some reason or other, there was a time when I could see Mr. Lemmon or Mr. Potts and arrange for a flow of materials for a while; but there were always interruptions.

Materials are coming forward a little more expeditiously now. Chapman has most of the frames he requires. He has a contract for a block of flats. The department has its own jobs at Narrabundah and has day-labour jobs at O'Connor. It is true that quite a number of bricklayers undertake jobs during the week-end. At week-ends, they work on a piece-work basis and, as generally applies to such jobs, the faster they work the better they pay. Furthermore, they work without supervision. In Canberra, bricklayers have to do a good job. I admit that some of the new cottages

being erected are fairly rough, but on the whole the brickwork in Canberra is as good as is to be found anywhere in the Commonwealth. In the past, the clerk of works used to stand over a bricklayer and watch him at work. All joints had to be full. Nowadays there are a lot of breaks. We have made representation to the department for the abolition of nibs in internal brickwork. In the bathroom of one of the cottages we are building now a nib is put running right up the wall. That is unnecessary. It was used solely for the purpose of hanging a door. Our union argued until the department agreed to replace the nib by a piece of timber upon which the door is hung. A bricklayer could lay three or four bricks while cutting one nib. Too many breaks in the wall slow down the job.

176. To Mr. Conelan.—Houses constructed under the Commonwealth-State housing scheme have too many breaks in the brickwork. All frame sizes work to brick sizes. An architect desires to have a window placed in the middle of a room, but for economical working you have to work that window to suit the brickwork; otherwise too many bricks have to be cut.

177. To the Chairman.—Where I am working now four trainees under the Commonwealth reconstruction training scheme are employed for each tradesman. The department is not pulling its weight in regard to these trainees. Last week an officer from the Department of Post-war Reconstruction asked if Primmer could place another man. Primmer said, "I am already over-loaded." I said, "What about asking the Department of Works and Housing to take him on?" The officer said "We have been to the department but the department has indicated that it can not get labourers". In the early days, private enterprise was always asking for labourers, but could not get them because they were absorbed by the department. As regards trainees under the Commonwealth reconstruction training scheme, we are saturated in Canberra. Unless it is possible to obtain a sufficient number of labourers and hod-carriers here, the Commonwealth reconstruction training scheme is of no value. It is not economic to employ more than five bricklayers on the construction of a single cottage. The wages now paid to bricklayers amount to £3 17s. 6d. a week. In addition some men are paid a living-away-from-home allowance. The payment of that allowance to some, and its withholding from others, has a bad effect on the industry. Those living at the Eastlake or Riverside hostels get their board for 32s. 6d. a week.

178. To Mr. Conelan.—The Englishmen do not get the allowance, but they pay only 32s. 6d. a week for board. The trainees under the Commonwealth reconstruction training scheme receive an amount approximating the basic wage. A single man receives initially £3 8s. a week. After six months' training he receives the full award wage, 60 per cent. of which is paid by the Commonwealth and 40 per cent. by his employer. After a certain period his efficiency is assessed and he is paid accordingly.

179. To Mr. Howse.—An officer comes down from Sydney to assess the percentage of efficiency of the trainees. I do not believe that that officer is doing a good job. The last time he came down he assessed from 20 to 26 men in a half a day. It was impossible for him to do his job properly in that time. It is true that he was here for three days, but a strike was in progress and he could not interview the men.

180. To Mr. Conelan.—The Building Workers Industrial Union had passed a resolution that no week-end work be done by its members except for a member of the union who is engaged in building his own home. In such cases members of the union may work for nothing or for whatever wages may be determined between the parties.

181. To the Chairman.—One of the most important means by which the relations between the workers and the department may be improved is by following the example set by private enterprise and establishing workers' committees to make suggestions for the improvement of the industry. The steelworkers have adopted such a system.

182. To Mr. McLeod.—I have suggested to the department that such a system be adopted.

183. To Mr. Russell.—That suggestion was made when Mr. Lazzarini and Mr. Johnstone inspected the job on which I was employed. I did not approach Mr. Lemmon on the matter, but I did recommend to him that we install "suggestion boxes" on the jobs, and that suggestions made by the men be considered and tried out by the department, and, if adopted, paid for. That proposal was put to Mr. Phillips, the Acting Works Director, and, although he agreed to it, nothing was done about it.

184. To Mr. Howse.—I do not believe that the difficulties I have described are peculiar to Canberra. They are Australia-wide. In Sydney a few weeks ago I spoke to a union official from Victoria who told me that the same trouble was being experienced by the building industry in that State. During the war a good deal of sickness took place, and many ex-servicemen, because of their war experiences, have returned with a feeling that they should not worry much about things. Undoubtedly many of the trainees under the Commonwealth reconstruction training scheme will eventually have to find their own level. These men are being trained for a period of two years. When, at the expiration of that period, their payments from the Commonwealth cease, it will be up to them either to sink or swim. I do not regard present-day rates of wages as a disturbing factor among the workers. Genuine Australians know that the war must be paid for.

185. To Senator Nash.—Taxes are definitely lower now than they used to be. Any worker sees that in his weekly pay envelope. Two years ago I was paying in tax 28s. a week. My tax is now down to 14s. a week. I am an Australian and I regard this country as second to none in the world. It is only utter fools who regard some place overseas as being better than this country.

186. To Senator O'Sullivan.—The time taken to train a competent bricklayer would vary greatly according to the aptitude of the trainee. On an average, it would take five years to train a youth from the time he leaves school. A keen worker would become reasonably efficient within, say, three and a half years. It is silly to say that a man can become a trained bricklayer in from three to six months. The industry is not getting a reasonable number of recruits as distinct from trainees under the Commonwealth reconstruction training scheme.

187. To Mr. Conelan.—It is still necessary to obtain recruits from sources other than the Commonwealth reconstruction training scheme. In my view, within a few years, many of the trainees under that scheme will automatically drop out of the industry.

188. To Senator O'Sullivan.—Many of them will not make the grade. Many of them were attracted to the building trade because the work looked easy and the pay was good, and, in addition, they would be paid a government subsidy while they were being trained. The average age of the trainees is 21 years and the oldest among them would be about 25 years of age. I do not believe that incentive payments over and above the minimum wage now prevailing would be effective as a means of stimulating the workers to greater output. That is a ticklish point. Incentive payments are contrary to the policy of the Australian Labour party. And there is a good reason for that. If a man is gifted

he gets along in his job very smoothly. He may become so proficient that he leaves the average man a long way behind. The average man may take one and a half times as long to do a job as would a very gifted man. The difficulty about incentive payments is that the standard rates would be broken down. The average man has the same right to work and live as has the gifted man. That applies in every walk of life, as also does the fact that in all trades and callings some men stand well above the average. The result is that the average man is working "flat out" all the time and the man who is little below average does not last very long. The man below average may do a good job, but he is not able to do it as quickly as an average man or an outstanding man. Generally speaking, the fast worker is inclined to do rough work. In order to attain speed it is necessary to sacrifice accuracy or efficiency. The man below average—the man of 40 per cent. efficiency—would always be dragging behind and would have a grudge against his more efficient workmate. Under that system the slower man would always be penalized. Under a system of incentive payments, the slower man would be "flat out" all day trying to keep up with the more efficient man and the incentive pay would set the standard. All but the most efficient men would be dissatisfied. I know something of this matter because I have studied industrial psychology. The system of incentive payments would not tend to greater efficiency over the whole industry.

In the heavy industries, such as those controlled by Lysaghts, the Broken Hill Proprietary Company Limited and Rylands, there was formerly a system of piece-work at a flat rate. Over and above a certain production the men used to receive additional pay by the way of a bonus added to their wages. However, the bonus was whittled down gradually until it was not possible for any worker to receive more than 30s. a week above his classified wage. Many men of 45 years of age employed in those industries were worn out. They started in the industry at 17 years of age and had burned themselves up by the time they were 45.

189. To Mr. McLeod.—I would not say that during the past six or seven years there has been a shortage of competent bricklayers because tradesmen have gone into other kinds of work or have retired. If a man learns a trade, he usually sticks to it. Generally speaking, bricklayers stay in the building industry. The majority of them have grown to love their trade. I spent four years and ten months in the engineering trade during the war. I found that trade very attractive, but I still like bricklaying because I was taught that trade as a boy. When I joined the engineering trade, I was subsidized by the Government, but I would not like to have stayed in it. I believe that was the experience of many people who left the bricklaying trade during the war period. If the records were examined it would be found that 85 per cent. of the men employed in the industry as bricklayers before the war are still engaged in that occupation. Today, the ratio of trainees to experienced men is very much greater than it used to be. That would reduce the average number of bricks laid by men employed as bricklayers. Mr. Oliphant said that a good bricklayer could lay 900 or 1,000 bricks a day. I shall gladly bet him £10 to £100 if he can produce in Canberra any bricklayer who could average 1,000 bricks a day on cottage construction, either of his own design or of departmental design. I do not contend that experienced bricklayers are doing as much work as they did before the war. Before the war there was always an unemployed bricklayer watching the job and hoping to be taken on. That engendered a fear complex in the minds of the men, which drove them to speed-up to a degree which could not reasonably be expected of them.

190. To Senator O'Sullivan.—A good man to-day would be doing a fair thing on cottage construction if he laid between 500 and 600 bricks a day.

191. To Mr. McLeod.—A contributing factor to the slowness of building operations is the shortage of builders' labourers. Labouring in the building trade is hard work. Builders' labourers earn good money. Builders are paying as much to-day for labourers as for tradesmen.

192. To Mr. Rankin.—Most of the trainees under the Commonwealth reconstruction training scheme are keen to get on. Many of them are trying to do their very best. Nearly all of them are married. The building trade is a good trade and, generally speaking, the trainees like it. There are, however, certain of them who, after having completed two years of training, are not worth their wages. Some of the employers in Canberra refused to pay them 40 per cent. of the award wage and allow them to attend technical college classes one afternoon a week. The employers naturally say, "Why keep them on when they do not earn their wages?" Such men are to be found in the employ of the Government as well as of private enterprise.

193. To Mr. Conelan.—Mr. Oliphant, who gave evidence before the Committee last week, is an architect and not a builder. He prepares the plans and specifications of buildings, but he would either employ a builder to erect them or call for tenders for their erection. The best bricklayer in his employ, Charles Gunley, would not lay 900 bricks a day. He may be able to lay that number on a straight unbroken 8-in. wall; but with breaks and bays, he could not approach that number. A bricklayer cannot merely pick up a faced brick and lay it. The bricks have to be picked over. A bricklayer may have to pick up three bricks before he gets one suitable to lay on the wall. Private contractors employ trainees as well as competent bricklayers. The competent bricklayers would be put on the most important work.

The witness withdrew.

John Richard Jenkins, Secretary of the Australian Capital Territory Branch of the Building Workers Industrial Union, carpenter and joiner, sworn and examined.

194. To the Chairman.—I agree with what Mr. Somes has said in regard to the building industry in Canberra. He is a bricklayer and I am a carpenter; but my experience of the industry places me in a position to know that everything he has said is correct.

195. To Mr. Conelan.—Conditions in the carpentering section of the industry are similar to those in the bricklaying section. We have suffered much the same sort of disadvantages as Mr. Somes has outlined in respect of the bricklayers. One of the big disadvantages in regard to the speeding up of brickwork has been the lack of window-frames. Cottages have had to be left in a half-finished state, and bricklayers have had to be taken off and placed on other jobs. Scaffoldings is tied up because it would be uneconomical to pull it down. Steel frames have been used but they must have lugs welded on to them to make them suitable. The engineers have been very busy on their own normal work and have not been able to get the steel frames out on time. Delays in supplying frames have held up cottage work to some extent.

One of the first disabilities we experienced on the resumption of building activities after the war, particularly in connexion with brickwork, was the shortage of builders' labourers. In many instances, we found that men who had been competent builders' labourers before the war came back from the war looking for better jobs. Those who returned to their former avocation were often disgruntled. It was not long before

they had blisters on their hands because they were unaccustomed to pick-and-shovel work. They said, "This is not what we went through Greece and Crete for." Their unfitness for the work slowed the bricklayers down. A somewhat similar attitude might have been noticeable among other workers, including tradesmen. I believe that Mr. Oliphant gave some good evidence when he said there was a hangover from the war. I am of an opinion that some people are suffering from a very definite hangover, especially the younger men who served in the war. Many of them have not settled down. Among the older men, one of the things that is irritating them to-day is the fact that their wages, which look high, are of no great value to them. A man who was getting \$6 a week a few years ago and is now getting \$20 a week finds that the higher wage will not buy him the things that the lower wage did prior to the war. He says that when he was getting \$6 a week he was able to save money. He is disgruntled about that and thinking and talking about it when he should be working. Those thoughts are depressing him and he has a feeling of frustration. When such a man goes home and his wife tells him she has had to pay 19s. 6d. for a pair of shoes for a six-years-old child, it breaks his heart. Similarly, he finds that he now has to pay \$4. 11d. for a pair of sandshoes which could be bought for 4s. 11d. before the war. The increase of \$3 a week in his wages does not compensate him for the higher cost of living. Most of the older men with family responsibilities are in a bad state of mind about this. When all these things are taken into consideration, it surprises me that the average production is as high as it is to-day.

196. To the Chairman.—Some evidence was given on the question of average output. When calculating the average number of bricks laid or the number of doors hung, is the output of all men lumped together, including learners as well as experienced men or are the figures based upon the output of journeymen? The figures are undoubtedly based on the output of the whole of the men on the job. The Commonwealth reconstruction training scheme can only lay as many bricks as their experience will enable them to lay. Apprentices are in the same position. If the output of all these men is lumped together to arrive at an average, the average will undoubtedly be low. This talk of low average output may make good newspaper reading, but it is not indicative to the true position.

The unions have taken a very keen interest in the Commonwealth reconstruction training scheme. As far as possible we have tried to ensure that there shall not be more trainees than tradesmen. If there are six carpenters or bricklayers on the job, we say the absolute saturation point is reached when there is one learner to each tradesman. We regard apprentices and reconstruction trainees as learners. We do not want learners working on their own or with other learners or apprentices.

197. To Senator Nash.—Before the war we allowed one apprentice to three carpenters. Other trades follow much the same ratio. We realize now, however, that times are abnormal and that the building industry must be stimulated and, accordingly, we are prepared to abandon orthodox ideas on this subject. I know one or two jobs on which the men employed are almost entirely trainees, but we know that the bricklayer looking after them is a good man, is interested personally in their welfare and is doing everything to help them. He is making up whatever deficiency might otherwise be apparent and is taking a keen interest in supervising the work of the trainees, guiding them in every way. On many other jobs, however, that would not be done.

198. To the Chairman.—The work of carpenters has been grievously held up because of shortage of materials. I could tell the members of the Committee stories in

that regard that would horrify them. It is true that there has been much improvement of the position. The unions have gone to the authorities and have made suggestions, as a result of which improvements have been effected. In certain instances improvements have directly resulted from representations made by the unions and the pressure exerted by them. In other instances the improvement has merely been part of the general trend. We can see the general trend of improvement every day. I had a conversation recently with a leading hand bricklayer on one of the biggest building jobs here, a man whom I have known for 25 years in Canberra, and a very competent bricklayer. What he told me bears out completely what Mr. Somes has said. He and Mr. Somes are in no way connected. I asked this man had he read the evidence given by Mr. Oliphant. He replied that he had, and that assertions that a man could lay 1,000 bricks a day on cottage construction was just so much moonshine. He said it might be done on some work but only on straight walls and footings. He expressed his opinion that a good average for a competent tradesman would be 400 or 500 a day, and if reconstruction trainees were employed the average might be brought down to 300 a day. The shortage of hardwood has been one of the great bugbears to the building industry. The authorities here have installed a hardwood mill and progress is being made in overcoming the shortage, but it still exists. The position in relation to the supply of tiles is well known. One needs only to go around this city to see the number of bare roofs awaiting tiles. Even the tile position, however, is improving gradually.

199. To Senator Nash.—You say that Mr. Oliphant made a statement that carpenters used to hang twelve doors a day and now they hang only four doors. Workers have a word which adequately but not very politely describes such statements. I am 41 years of age and have been working in the carpentering trade since I was thirteen, and I have never met a man who could hang twelve doors every day in such a way as to ensure that they would function. However, I have heard—and I do not disbelieve it—that on odd occasions a carpenter has hung twelve doors in a day. The point I make is that no carpenter could maintain that rate. Some accidental circumstances may make such a task possible. The statement made before the Committee is definitely untrue.

This morning I rang the foreman in charge of the construction of one of the biggest groups of cottages in Canberra. He is employed on a government job where, if you believe some people, men are supposed to drag the chain. I asked him how many doors his men were hanging. He said, "My men have been hanging eight doors a day." Members of the Committee could inspect the job and check on the accuracy of these statements. The work is going on now and may be inspected at any time. These doors are flush type mangle doors, not easy to hang because of the glue in the plywood which blunts the plane irons.

I interviewed the foreman of another job and asked him how many doors his men were hanging. He told me they were averaging six doors a day. At that time I had not contacted the men who told me his men were hanging eight doors a day. I ascertained that on the job where six doors are being hung the percentage of Commonwealth reconstruction trainees is greater than on the job on which the average is eight doors. The job on which the output is greater is one of the first day-labour jobs to commence here since the war. The men employed on it have been going from group to group of construction jobs. On

that job there is a bigger percentage of journeymen. These were two-hinge doors of the ordinary type. I have been employed hanging doors in Canberra when other men have been waiting to get my job if I were not good enough. I was then hanging eight soft-wood doors a day. The contractor with whom I was employed, who was reputed to be the hardest man to work for in Canberra, was quite satisfied with that number. For a carpenter to achieve the rate of twelve doors a day he would need also to be fitting the door-jambs and would need to know the exact size of the doors in advance. He would probably make his door-jambs a little bigger than the doors so that he would only need to take a shaving off the doors to fit them. In such circumstances, with careful planning, it may be possible for a good man to hang twelve doors a day; but these conditions do not exist. In all the time I have spent in the industry I have never been able to put my finger on a man who could hang from twelve to fifteen doors a day. It is true, however, that I can sometimes find a man who knew another man who could do so.

Mr. Oliphant's statement in regard to the output of bricklayers and to the average number of doors hung a day, has made him the laughing stock of Canberra. His statement that the average number of doors hung by each man in a day is four has, I think, been completely refuted. The Committee might think it worth while to inspect the work now being done.

200. To Mr. Russell.—Generally speaking, carpenters are just as efficient to-day as in earlier years. I have noticed the tendency to some slackness on all sides. I attribute that mostly to the state of mind of people to-day, among the younger men for one reason, and among the older men for another reason, with which I have already dealt. There was a much better tempo among workers during the war. They felt that they were making sacrifices, but were glad to do so in order to help the war effort. On defence work during the war period we worked night and day, Saturdays and Sundays. The organization was good. There was no shortage of materials then. When Mr. Orwin was Assistant Works Director to Mr. McHaffey, I visited their office to discuss some union matter. Mr. Orwin told me in the presence of Mr. McHaffey that the progress of defence works in the Territory was excellent. He said that the work had been done below cost and had been finished before the estimated date of completion. He said it was very pleasing indeed. I said, "That looks like a good argument for day labour." He said, "That has not always been the story"; and he informed me of certain jobs that had not come out too well before the war. I could tell him of some others. Before the war on many day-labour jobs, supplies of materials were on hand, and drive and organization were lacking. In the war years all that was changed. The men, the leading hands, the foremen, the clerk of works and the architects were all on their toes.

201. To the Chairman.—The departmental officials are not as sympathetic towards day labour as they should be. Perhaps I should qualify that by saying that, under a system of general contract work, their job is much easier. They draw up plans, take out estimates and quantities, and then pass on the work to the contractor. They send a clerk of works on to the job to stand over the contractor and see that he does the work properly. On a day-labour job the position is quite different. They have to get around the job and instil some enthusiasm into the men in charge. They have to do very much more in the way of regulating

supplies of materials and overcoming bottlenecks. It is human nature to get along in the easiest way possible to a certain extent.

202. To Senator O'Sullivan.—Government controlled day labour seems to lack drive and efficiency in some instances. I do not know why that should be so. However, I do not believe the position to be irreparable. We have risked making ourselves unpopular by going to the Action offices and having long interviews with the officials there in an attempt to put forward our ideas from a practical point of view. We have invariably been given a patient hearing and some of our suggestions have been adopted. For instance, we were instrumental in having the building of one type of cottage abandoned. In that design there were more bricks above the ceiling line than there should have been and too much steel to support brick work over long stretches of windows and under gables. Some cottages of that type had been built, however, and bricks, material and labour were wasted on them. As the result of our representations other details in design were remedied or modified. It is ridiculous that men working on the jobs should have to go to an architect to point out constructional faults of that kind. We did it, however, because we could see the waste that was going on.

203. To Senator Nash.—There appears to be a belief in some quarters that the unions tell the men that they are to do only a certain amount of work. That is not so. All we say is that we do not want our members made slaves as they were before the war. I worked for private contractors before the war and in order to keep my job, had to work harder than any body should have been asked to do. Furthermore, I had to "slum" work. On one job on which I worked the contractor told me that if the clerk of works was absent at the appropriate time not to put lead-flashing under the windows but to get the windows covered up with the architraves so that he would think they had been put in. I had to carry out those instructions or I would have been sacked. I gave sworn evidence along these lines to another body.

There appears to be an opinion in some quarters that the unions are a drag on the men. Union officials and executives have gone out of their way to speed things up. We have lectured men at meetings about the housing position. We have told them that if the cost of a cottage is higher than it should be, a working man will be the victim. Shop and job stewards are selected from men who have some influence in stirring the men to do their best. At meal breaks, or when sheltering from the rain, they talk things over with the men and steer the conversation to a discussion as to the advisability of increasing output. On a day-labour job a man is really working for himself, because it is paid for by the taxpayer. The Government has always been a reasonable employer. I have found that so, I treat the workers badly as do private contractors, many of whom use every device in order to escape payment of holiday pay and the like to their employees. We have urged our members to give of their very best. Shop stewards have been instructed to talk to the men along those lines. If a union official said to a worker, "You are doing too much work," he would immediately be dealt with by the union.

I understand that in his evidence Mr. Oliphant said that a good worker would hang twelve doors a day. I mentioned the figure of fifteen. I have heard it said that architects have claimed to know men who could hang fifteen doors a day.

The witness withdrew.

(Taken at Sydney.)

MONDAY, 8TH DECEMBER, 1947.

Present:

Senator Lame (Chairman).	
Senator Nash.	Mr. McLeod.
Senator O'Sullivan.	Mr. Rankin.
Mr. Beale.	Mr. Russell.
Mr. Conelan.	

David Victor Isaacs, M.C.E., M.Inst.C.E., M.I.E.E., Aust., Director, and Oscar Andrew Bayne, Assistant Director, Commonwealth Experimental Building Station, North Ryde, Sydney, sworn and examined.

204. *To the Chairman.*—Mr. Isaacs.—To tell you the functions of the Commonwealth Experimental Building Station in a short space of time would be difficult, but a booklet issued a couple of years ago, entitled *Commonwealth Experimental Building Station, North Ryde, Sydney: A Brief Explanation of the Organization and Work of the Station*, gives an idea of what we are doing. I refer you to:

Introduction—

1. The objects and functions of the Station.
2. The work of the Station.
3. The organization of the Station.
4. Co-operation and liaison with the Industry and Government Departments.

The station is concerned with building research generally, except research into building materials, which is the responsibility of the Building Materials Research Section of the Council for Scientific and Industrial Research. I will explain the difference between our work and that of the Council for Scientific and Industrial Research. The Building Materials Research Section covers building materials as such. For instance, it does all the research into the properties of concrete—its strength, its qualities as a mixture, that is whether it is a harsh or workable mixture, its thermal qualities, that is whether it transmits heat readily and how much heat it does transmit. The same line of approach applies to other materials. Take, for example, wall boards. They are examined for physical and material properties by the Council for Scientific and Industrial Research. We take over the examination of the possibility of using the materials in building construction. By that I mean that, knowing that there is an acute housing shortage, we may discover substitute materials for those in short supply, or how to make better use of existing materials. For instance, we can use asbestos cement in a corrugated instead of flat form as you saw at the station.

205. *To Mr. Conelan.*—We have been told that manufacturers will supply particular materials if they receive a sufficiently big order from the Housing Commission of New South Wales or any other authority or private company undertaking the building of a large number of houses. Another illustration of how materials may be saved is this: Bricks are ordinarily laid on the flat, but we have recommended the use of brick-on-edge construction in external and internal walls. That gives 3-in. instead of 4½-in. thickness. That has no reference to the Council for Scientific and Industrial Research. Where we obtained its help, for instance, was on the size, shape and thermal qualities of concrete slabs for housing purposes. We intend building a complete house of special concrete slabs to show their practicability. Concrete houses built in Queensland are not of the same design as ours. There is nothing like this design elsewhere in the world, because there are fundamental differences in the basis of design. We hope to make changes in

traditional construction, such as laying bricks on edge instead of flat and the use of smaller timber for floors, in order to economize through the better use of materials. We hope to improve the quality of construction without increasing costs and, if possible, to get cheaper construction. Our big job is to bring costs down. We must get stable construction, proof against the elements of wind and rain. Buildings must also be insulated against extremes of heat and cold. That applies to the building of offices and factories as well as houses. It is possible that we shall be able to give good advice about the proposed new administrative block at Canberra for the Council for Scientific and Industrial Research. We can give advice on all new forms of building construction.

206. *To the Chairman.*—In order to popularize the construction of our design of concrete houses, we will invite the State Housing Commissions to inspect the completed dwelling. Another construction that you saw on Saturday during your inspection of the station is the standard kitchen. We intend to do the same thing there. We have had a representative of the Victorian Housing Commission out and we hope that a representative of the New South Wales Housing Commission will come to look at it. We hope to get a rough price for large-scale production of that kitchen. Then we hope to have it accepted by the Housing Commissions and any one else interested. I feel that the only way to get people interested in our corrugated asbestos cement is by getting them to look at it. What does it cost? What is it like to live in? We shall give a satisfactory answer.

207. *To Mr. Conelan.*—The cost of our corrugated asbestos cement should be slightly below or about that of ordinary corrugated asbestos. The flat sheet is cheapest. Ours involves the same type of work as the manufacture of corrugated asbestos, but we get slightly more cover. We anticipate from our discussions with manufacturers that in large-scale production the cost would be about the same or slightly cheaper. Corrugated sheets would cost a little more than plain. I could not tell you the actual difference in the costs. You must realize that you get a higher quality of construction from this sheet. That house would cost more than an ordinary asbestos cement house but less than a brick house, and will give you in internal comfort, general stability and suitability something between brick and ordinary asbestos cement construction.

208. *To the Chairman.*—We have been operating for three and a quarter years. I am asked what discoveries of ours are used by commercial builders. The commercial people are a little slow in accepting new ideas. We have interested housing commissions in smaller foundations and smaller-sized timbers for flooring. Nine months ago the conference of the Commonwealth and State Housing Commissions agreed to adopt smaller foundations and smaller timbers for floors and walls. People have to be persuaded to use novel methods.

209. *To Mr. Conelan.*—By "smaller timber" I mean 3-in. by 2-in. instead of 4-in. by 2-in. joists. Eighteen months ago we advocated 9/16-in. instead of 13/16-in. hardwood floor-boards. Floor-boards of 9/16-in. thickness are cut from 4-in. stock, whereas 13/16-in. thick boards are cut from 1-in. stock. That gives you 33 per cent. more floors from the same quantity of wood. Flooring is a bottleneck in the building industry. The Victorian Housing Commission is about to build a house with the thinner floors. Our work is beginning to bear fruit now. These things are hard to put across. The same thing applies to brick-on-edge construction, which is being accepted

against opposition. Bricklayers do not like it. Nevertheless, they are adopting it. After persevering, they are convinced it is cheaper. The same thing applies to everything we do. We must break down opposition.

210. *To the Chairman.*—The mechanical hoist that the Committee saw at the station is about the first piece of special equipment we produced. We intend to place it on demonstration. Plant that we ordered eighteen months ago from England has not yet been delivered. We have "propaganded" no-fines concrete construction for some time. Eighteen months ago, we wrote a building code covering the use of no-fines concrete construction in building. We have reached the stage at which we are going to build a house in Canberra by the no-fines concrete construction method. We had to get the authorities there to agree. I have produced copies of building codes that we have written to cover new forms of construction. We have been asked to produce codes for particular authorities. They have been adopted almost verbatim. They are law in the New South Wales sphere and could be law all over Australia if people were interested.

Glass bricks and tiles are not cheap and we would not consider their use in low-cost work. Plastic materials look very nice on paper but they are expensive. Plastics will be adopted in building, but only for fittings like electric light switches. They will not be adopted on a big scale. We shall not have plastic houses in our lifetime. They may be built in the far distant future.

211. *To Senator O'Sullivan.*—The Standards Association was very interested in the standard door and window-frames. It looked hopeless to get agreement, but our representative managed it, and the manufacturers produced standards based on our recommendations. The Standards Association will go into the matter of standard-size floor timbers. The adoption of our recommendations by the Standards Association would give them official standing. The difference between the cost of brick-on-edge and brick-on-flat construction is only a few pounds, say £30, in the cost of a house. With brick-on-edge construction you get an effective height from each brick of 4½ inches instead of 3½ inches. An argument against brick-on-edge construction is that it requires more labour because it is harder to lay bricks that way. There is a fair saving in the cost of the material, but some authorities say that there is no saving in the cost of labour and other authorities claim that there is a loss of labour. The saving in bricks and mortar would be 25 per cent. Labour represents 50 per cent. of the total cost, and that must be taken into account. At first, bricklayers might be slowed down by the brick-on-edge method until they become used to that system.

The 8-ft. ceiling height must be accepted by the municipalities before it can become a real thing. We are absolutely confident that an 8-ft high ceiling is quite satisfactory for health. In fact, people living in houses with ceilings of that height are better off in some respects, because the windows can scavenge the warm air from the ceiling. You get a quicker change of air and you can take better advantage of a cool change by having less heated air. Then there is less weight of material in walls. It must be cheaper because the mode of construction is not altered. There is no advantage in high gables because we have little snow country. Tiles must be waterproof. A pitch of 27½ degrees is usual.

212. *To Mr. Rankin.*—We have experimented with concrete brick construction. We got a machine out from England to make experiments, but the Department of Works and Housing wanted it. We have prepared a code, which has become law in New South Wales, in respect of concrete brick construction. We

feel that a lot of the manufacture of concrete bricks and blocks has been by people who do not understand the pitfalls. We encourage manufacturers to come to us with the bricks. We test them to ascertain whether or not they comply with the code. It may be that buildings are put up that do not comply with the code. We know that concrete bricks can be satisfactory. Much experimental work has been done in connexion with the water-absorption of building materials. There is no reason why materials which have a fairly high water-absorbent capacity should not be used for internal walls. Bricks absorb water but dry out. Dense concrete may not absorb much water.

213. *To Mr. Russell.*—We are finding it hard to get technical staff, principally because the salaries offered are not quite attractive in comparison with salaries outside. We have lost good men. Secondly, there is a comparative shortage in Australia of men of the type we need. While there is competition for them, we must suffer if our salaries are not high enough. Theoretically, there would be men overseas who could migrate to Australia and join our staff, but in order to attract them we would have to pay higher salaries. That is the hurdle that must be overcome. Basically, in relation to qualifications, it is no use saying, "I want an engineer or an architect". The man required is a competent man with an independent outlook. Therefore, he must be experienced and with high qualifications. A man with experience and high qualifications wants a lot of money. Our estimates are made in the ordinary way. We have felt that perhaps we ought to be voted a little more money than we have been. Had we had more money we might have done more. We are bound by Public Service Regulations. We have always tried to present honest estimates of our needs, but there is always a pruning. We are in some difficulty about building materials—steel, timber, bricks, fibrous plaster. Whatever we want we are up against problems. The Housing Commission has co-operated by giving us priorities for bricks. Business concerns have supplied us with cement, but supply difficulties have caused delays.

You ask me whether we are getting co-operation from all departments. It depends. If you say "housing commission", the Victorian Housing Commission has been co-operative, but we have not received what we should have liked from New South Wales. It has taken time for the right mind to develop among those capable of using our advice. Do you say "New South Wales has not given you full co-operation"? I do not think they are imaginative enough. There is a distinct contrast between the approach of the people of Victoria and New South Wales—I will not say there is lack of imagination, but we have not seen the imagination we should have liked to see from New South Wales. If we had, there might have been better results.

214. *To Senator Nash.*—In each year our estimates have been cut by 25 per cent. or more. The estimates that have gone to the Parliament have been pretty well as we have put them up.

215. *To the Chairman.*—You ask me whether they have been cut by the Department of Works and Housing. Yes; it amounts to that.

216. *To Mr. Russell.*—You ask me whether the reduction of our estimates has impeded our investigations. We need equipment and buildings. I was asked about houses. We could spend a lot of money in bringing equipment from overseas. As you will appreciate, in doing the work we do, we must have good equipment. We have made equipment and plant ourselves. We have cut our coat to the material. We have had to put off doing certain things until we get more money.

217. *To Senator Nash.*—Some of the better-known architects have been in touch with us, but we hope for more co-operation from them. Only a few are prepared to go ahead with what we recommend. Some have asked us to determine the causes of wall cracks. We have recommended to architects that they provide for the use of smaller sizes of timber, but we do not know how far we have got. We issue a literature to the building trade and we have had a good response. We circularize engineers and architects and certain people in the building trade, saying, "There is a list of the matter we have prepared at 1s. or 2s. a copy. If you want it, send in your order." We have had £600 worth of orders. Practical builders have viewed our work on the soil cement wall. They are becoming interested in it. It appears to have stirred outside imaginations quite a bit. We gave the Department of Local Government a copy of our notes on that form of construction. Copies have been circulated among municipalities in New South Wales. We have had inquiries from them. One local builder intends to try the method out. It may be that the strength of the wall is not so great as that of a brick wall, but that does not matter. I am confident that the wall we have experimented with are strong enough. I am not necessarily referring to soil cement walls. You can mix clay and sand in the right proportions and get a stable mixture. It is vastly improved with the addition of 10 per cent. of cement or some bitumen. If you use a mixture of plain clay and sand, you may have to render it. We are experimenting on that and have not yet got the final answer.

218. *To Mr. McLeod.*—It may be possible to demonstrate a model pig house. That type of house would be useful in the dry interior; the material takes quite a while to warm up. It does not warm up to anything like the extent of asbestos cement. It is cool in the day time and it would take a long hot spell to bring the temperature up to an uncomfortable degree. Assuming that it is possible to use some mechanical methods, the cost of construction would be lower than for brick. We do not believe great skill would be needed in building. We must see what can be done to make casual builders, perhaps farmers, to go ahead with construction with a few simple directions. We hope that more or less unskilled people will be able to undertake pig construction.

We have adopted light timber trusses on the outer wall to outer partitions to be of light material as they are not required to take the weight of the trusses. We consider that the trusses used hitherto have been heavier than is necessary.

219. *To Mr. Conlan.*—Our recommended codes of practice for various materials are supplied to the Standards Association, Housing Commissions, appropriate public departments, municipalities and anybody interested who writes asking for them. In New South Wales we send copies direct to the Department of Local Government, which examines the codes recommended and when they are adopted by it they are binding in the State. The code on concrete blocks is law in New South Wales. The Standards Association has gone into these things, but our own authority carries weight with people who know us.

220. *To Mr. McLeod.*—Mr. Bayne—We have many inquiries from the building industry generally, particularly from the professional side, concerning many different kinds of troubles. It is from these inquiries that we build up our programme, because they indicate what is troubling the industry.

221. *To Senator O'Sullivan.*—We give as complete an answer as we can from our own knowledge and literature. If experimental work is necessary, we go

to the inquirer and say, "This will cost money", and ask him to finance it if it is an individual matter. We finance it if it has general application.

222. *To Mr. Beale.*—We prepare an annual programme of work as far as we can in advance. That programme is built up from individual inquiries from the industry, government departments and housing authorities. Conferences of the housing authorities indicate to us their prime needs. Our programme is built up on that background. That programme is stabilized after discussion with the Department of Works and Housing, but it must be flexible. We are frequently delayed by lack of equipment and specialists. We may intend to do certain work, but cannot get for a considerable time, the equipment with which to do it. We are in touch with the Institutes of Architects in the States, but I agree that they do not use our facilities as much as they might. That is quite natural, because ours is long-term work. Our contact is primarily with the architect in trouble, and those contacts are valuable because the men concerned learn that we can sometimes help them. Architects and engineers do not worry research organizations unless they are in trouble, because they are inclined to adopt established methods and do not explore uncharted fields. The general practitioners will wait until we have proved new forms of construction before they adopt them for use. They are handicapped by the local government building regulations in the adoption of novel methods. In every country it is difficult to make regulations sufficiently specific to adequately control building, and sufficiently elastic to allow new development. Because the New South Wales regulations did not permit concrete-block construction, we had to create entirely new codes for that kind of construction. That work has gone further in New South Wales than in other States. In Victoria, the flies are allowed unless they are brick-work. The authorities there have asked us to draft new regulations which will permit the use of light metal and other light construction for domestic flies. We have not directed propaganda to Municipal Councils. I do not like the word "propaganda". Our publications are very detailed and technical and are not suitable to be read by the normal builder or most normal architects. I think we shall have to set up a separate system of documents interpreting our detailed documents. The detailed documents will become library publications, and simplified interpretations will be issued to the normal industry.

223. *To Mr. Russell.*—I agree with Mr. Isaacs that higher salaries are needed to induce specialists to join the staff of the station.

224. *To Mr. Conlan.*—There is no training course for building scientists and there is no established profession. We have to draw on practising engineers and architects for men with the background we need and then turn them into exploratory work. We are competing with the professions and we cannot always get the men we want. In the scientific field we are competing for men not so much with commerce as with the Council for Scientific and Industrial Research. We have not as many engineers and architects as we need.

225. *To the Chairman.*—Mr. Isaacs—We have six vacancies for "top" men. I have been trying for ten months to get an engineer of a certain type. It is merely because we cannot offer a sufficient salary. That I have not been able to fill the vacancies. We are bound by the Public Service Regulations.

226. *To Mr. Russell.*—Our work is impeded by our lack of staff. I advertised for an architect and did not get a reply. I am confident that we should receive applications for the jobs if the salaries offering were high enough.

We have done work at Mildura. We are starting at Broken Hill and Newcastle. We intend to carry on at Darwin and, if necessary, we shall operate in New Guinea. Working with small-scale models, however, we can duplicate tropical conditions at the station here.

The following is a schedule of all special reports prepared by the station since its inception. These reports are prepared on a request being received from a responsible organization and are regarded as confidential. A limited number of copies only are available and copies are not made available to the public except with the express approval of the sponsor of the proposal reported on:—

6/1.—Report on the Dampney system of house construction. By F. G. Hole, 1946.

6/2.—Second report on the Dampney system of house construction. By F. G. Hole, 1946.

6/3.—Report on the Dampney system of house construction. By F. G. Hole, 1946.

6/2.—Second report on system of house construction sponsored by E. J. Millar. By F. G. Hole, 1946.

7/1.—Report on the Ross system of formwork for concrete house construction. Prep. by D. V. Isaacs and W. P. Brown, 1946.

7/2.—Report on the Ross system of house construction. By H. E. Tasker and John E. Ferris, 1947.

10/1.—Report on a pre-cast concrete-slab house erected at Pagewood, New South Wales, by D. Popplewell. Prep. by D. V. Isaacs and S. E. Ancher, 1946.

10/1.—Report on a prefabricated plywood house erected at Balwyn, Victoria, by Messrs. Romko Proprietary Limited, and Messrs. Jennings Construction Company. Prep. by D. V. Isaacs and W. P. Brown, 1946.

74/1.—Report on concrete blocks proposed by Beckett's Pty. Ltd. By F. G. Hole, 1946.

82/1.—Report on test on light steel roof trusses. By F. G. Hole, 1946.

82/2.—Report on tests on steel angle-to-timber fixing clips. By D. Dalgleish, 1947.

88/1.—Report on the Monocrete system of construction at C. Peacock, patented development by Minor Industries Ltd. By D. V. Isaacs and M. H. Norris, 1946.

88/2.—Report on Monocrete house erected at Noble-avenue, Bankstown, by Permalones Pty. Ltd., for the Housing Commission of New South Wales, 1946. By R. O. Phillips and A. F. Boyd.

94/1.—Report on tests carried out on pre-cast pre-stressed concrete panels. By A. F. Boyd, 1947.

94/2.—Report on electro-curing of concrete. By A. F. Boyd, 1947.

151/1.—Report on two houses with external walls and roofs of Sclaxon steel sheet panels, located at Solander-street, Matraville, New South Wales. By R. O. Phillips and H. E. Tasker, 1947.

160/1.—Report on a house constructed with "Denaro" pre-cast concrete blocks erected for the New South Wales Housing Commission in Penrose-street, Lane Cove, Sydney. By M. H. Norris, 1946.

200/1.—Report on the Beaufort house being constructed in Melbourne by Department of A. G. Production. By D. V. Isaacs, O. A. Bayne and J. E. Ferris, 1946.

200/2.—Report on the "Seco" System of construction sponsored by Uni-Seco Structures Ltd., London. By Marcus H. Norris, 1946.

213/1.—Report on the construction of the Arcos steel house, produced by Arcos Electric Arc Welding Products. By D. V. Isaacs, and others, 1946.

252/1.—Report on the use of tempered masonry prewood for floor covering on (1) a solid sub-floor construction and (2) a sub-floor consisting of beams and battens at various spacings. By B. Borwick and H. E. Tasker, 1946.

278/1.—Report on a house of in-situ concrete with terra cotta block facing, erected for the Housing Commission of New South Wales, by C. F. Gage. By R. O. Phillips, 1946.

283/1.—Report on the construction of the second floor prefabricated house, by D. V. Isaacs and O. A. Bayne, 1946.

283/1.—Report on steel framed strawboard and cement-rendered house erected at Earl-street, Granville, New South Wales, by Insulated Houses Pty. Ltd. By F. G. Hole, 1946.

298/1.—Report on the transverse strength of corrugated asbestos-cement roofing sheets. By A. F. Boyd, 1946.

308/1.—Report on house of pre-cast concrete slabs with infilling of in-situ concrete, by Tuck, "Stonite" in course of erection for the Housing Commission of New South Wales. By R. O. Phillips, 1946.

312/1.—Report on a house of reinforced cement mortar cavity wall construction by Hook Bros., erected for the New South Wales Housing Commission in Eileen-avenue, Dee Why. By J. E. Allsup and J. E. Ferris, 1946.

313/1.—Report on a house of reinforced cement mortar wall construction by "Colmar" Pty. Ltd., erected for the New South Wales Housing Commission. By J. E. Allsup and J. E. Ferris, 1946.

314/2.—Supplement to 313/1.

314/1.—Report on a house of pre-cast concrete construction by J. M. Cornish, erected for the New South Wales Housing Commission. By J. E. Allsup and J. E. Ferris, 1946.

316/1.—Report on steel house constructed from pre-fabricated units on lot 17 Northcote-road, Bankstown, New South Wales, by Steelok Homes (Aust.) Pty. Ltd. By J. L. Browne and H. E. Tasker, 1946.

316/1.—Report on house with pre-cast concrete slab walls erected on block 21, Hillcrest-avenue, Bankstown, New South Wales, by "Ring" Homes. By J. L. Browne and H. E. Tasker, 1946.

319/1.—Report on a house having pre-cast concrete slab walls erected by Steelok Homes (Aust.) Pty. Ltd. By J. L. Browne and H. E. Tasker, 1946.

320/1.—Report on a single storey office building of steel frame and reinforced wood-cement slabs erected for the sponsor H. G. Jaeger, Esq., at 117 Church-street, Ryde. By J. L. Browne and A. F. Boyd, 1947.

326/1.—Report on the "Truline" brick machine and "New Method" bricks. By J. L. Browne and J. Ferris, 1947.

334/1.—Report of tests on pre-cast concrete masonry units manufactured by W. J. Sloper. By J. L. Browne and A. F. Boyd, 1947.

372/1.—Report on "Section 1" pre-fabricated houses manufactured and erected by Messrs. Vandyke Bros. By J. L. Browne, 1947.

378/1.—Report on houses of partly pre-fabricated timber frame by Hutcherson Bros., erected for the Housing Commission of New South Wales. By J. L. Browne, 1947.

A series of technical memorandums has recently been established in which are recorded all minor technical matters engaging the attention of the staff, including results of day-to-day tests, replies to inquiries, results of searches of published information, &c. These memorandums are regarded as confidential and not made available to the public, but where they are suitable they are used in reply to inquiries. Where these memorandums are considered to be of general interest they are circulated to all Directors of works and other interested persons. The following is a schedule of the technical memorandums issued to date:—

SCHEDULE OF TECHNICAL MEMORANDUMS ISSUED TO 20TH NOVEMBER, 1947.

Technical Memo. Number.	Title.
1	Some Factors Affecting Building Design and Town Planning for Tropical Areas
2	Water Penetration Tests on System 94 Precast Concrete Panel System
3	Kitchen-Laundry-Bathroom unit produced by Kimball-Money
4	Living Quarters at Carlton Reach, Ord River, Western Australia
5	Tellach Bone Steel House
6	The Helidon
7	Weatherproofness of Concrete Tiles
8	Wind Velocities at height of 70-ft above ground level
9	Report on light R.S.J. Test Pilots to various depths at Villawood
10	Report on tests carried out at Station on Tiles bearing capacity of 4' x 8' R.S.J.s
11	Water Penetration Tests on Concrete Roofing Tiles Imbedded shingle pattern, supplied by A. J. Beccio
12	Weather Penetration Tests on Concrete Roofing Tiles, masonry pattern, supplied by New South Wales Housing Commission
13	Tests on Clay Tiles from Department of Building Materials—Project 386

SCHEDULE OF TECHNICAL MEMORANDUMS ISSUED TO 20TH NOVEMBER, 1947—continued.

Technical Memo Number	Title
14	Tests on Tiles supplied by O. Bayno—Source Franco—Gulchard Carvin & Co.
15	Tests on Roofing Tiles—Source—Australia—C.R.B.S.—Wunderlich
16	Tests on Roofing Tiles—Australia—Ralph Williams, Strathfield
17	Tests on Roofing Tiles—Australia—A. J. Beech, St. Ives
18	Tests on Clay Building Bricks— (1) Lithgow Vale of Clywdd (2) Butcher Bros., Ararat
19	Tests on Roofing Tiles—Donoside—Porter & Galbraith
20	"Oakited" Sawdust Asbestos Flooring Material, Confidential
21	Holmesglen Housing Factory—Concrete Tile Making, Confidential
22	General Provisions for the Installation for Self Contained Solid Fuel Burning Appliances
23	Production in Building & Civil Engineering Analysis of Man Hours and Machine Hours
24	Notes on Design of Domestic Buildings in Southern Australia
25	Murray Valley Resources Survey
26	Beaufort House—Notes Regarding Anticipated Thermal Performance
27	Trends in Australian House Construction and Design
28	Water Penetration Tests on No-fines Concrete
29	No-fines Concrete—Nailing Buttons to Walls
30	Work of Station—For Advisory Committee.
31	Renderings of No-fines Concrete Walls
32	Roof Slopes
33	Report on Mould Growth
34	Tests on No-fines Concrete Construction Joints, Project 3397
35	Tests on Concrete Roofing Tiles—Concrete Industries
36	Water Penetration Tests on the Flashing of Frames in No-fines Concrete
37	Results of Tests carried out on Dumbuck Bricks
38	External Rendering on Wire Mesh and Expanded Metal
39	Weather Penetration Tests on Pressed Zinc-annual Roof Sheet, manufactured by Wunderlich
40	Weather Penetration Tests on Concrete Roofing Tiles (manuscript pattern), manufactured by W. J. Reynolds
41	Report on Tests carried out in conjunction with the manufacture of Precast Masonry Units by the "Tranco" Automatic Block and Slab making machine using Canberra Aggregate
42	Lime Cement Concrete
43	Workshop Report on Tranco
44	Absorption Tests on Concrete Tiles, manufacturer R. J. Reynolds
45	External Renderings—Proposals for the investigation of the causes for and possible methods of prevention of cracking and crazing of external rendered surfaces
46	Dumery Air Flow—Brisbane—Supplied by L. F. Stuckey
47	Programme of Work Proposed, October, 1947, March, 1948
48	Animal Health Laboratories, Alice Springs—Considerations arising from discussions with Dr. Seddon, 18th September, 1947
49	Strain's Hot Water Boiler
50	Deduction Tests on Steel Forms for No-fines Concrete
51	The Preparation of Vibrated Concrete Surface for Plastering
52	Weather Penetration Tests on Pressed Zinc-annual Roof Sheet
53	Self-contained Solid Fuel Burning Appliances
54	Weather Penetration Tests on Clay Roofing Tiles (manuscript pattern)
55	Weather Penetration Tests on Concrete Roofing Tiles
56	Gas and Electric Water Heater for Domestic Automatic Hot Water Services
57	Durability of Galvanized Wall Ties
58	Testing of Six Solid Precast Concrete Units for H. Russell
59	Brick Wall Reinforcement
60	The Basis Idea of the unit Kihon built at the Station
61	Brickette Failure in Domestic Fireplace

SCHEDULE OF TECHNICAL MEMORANDUMS ISSUED TO 20TH NOVEMBER, 1947—continued.

Technical Memo Number	Title
62	Flat Roof Construction Tested at Station requested by Department of Works and Housing
63	Manufacture and Testing of Concrete Bricks—Confidential
64	Estimates for system 94
65	Report on System of Prefabrication using Asbestos Cement Sheet
66	Notes of the system of flat roof construction used on the extension to the G.P.O. and Naval Stores Building—Garden Island, Sydney
67	Protection of Steel Building
68	Wires in Doors
69	Portable Buildings Hoist
70	Inspection of Timber Shuttering for No-fines Concrete, J. Garrett
71	Manufacture and Testing of Concrete Bricks
72	Trulline Brickmaking Machine
73	Manufacture and Testing of Concrete Bricks
74	Liner Block and Slab-making Machine
75	Horizontal Damp-proof Courses
76	K.H.B. System of Construction, L. Roubaudi
77	The use of Aluminium for Roofing
78	Timber Floor Substitutes
79	Jackson's Concrete Products
80	Concrete Roofing Tiles—Summary of work done

No further codes of practice are at present being prepared. The following is a schedule of the more important general inquiries received in recent months—

Reference Number	Title	Classification of Inquiry
421	Shire of Patrick Plains	Concrete Tiles
422	Shire of Walcott—Request for advice on use of Wood-text (Woodwool) board	Woodwool
423	Municipal Engineer, Wagga—Request for proposed concrete, no-fines and brick house	Concrete
424	H. R. Hay—Request for comment on a proposal for steel and precast concrete construction	Concrete
430	A. W. Gardner—Request for information on concrete tiles	Concrete tiles
435	H. J. Darby—Request for information on pisé	Pisé
436	R. H. Halbert—Request for opinion on concrete construction by H. W. Horsell (Adelaide)	Concrete
437	A. E. Richards—Request for information on pisé and comment on sample of clay	Pisé
440	R. B. Patrick—Request for advice on brick-veneer construction	Brick
445	M. A. B. Watkins—General inquiry in regard to concrete bricks and tiles	Concrete tiles
448	W. Rowney—General inquiry in regard to Denaro and other concrete blocks	Concrete blocks
451	M. O'Connor—General inquiry in regard to blocks and blockmaking machines	Concrete blocks
454	Secondary Industries Division—General inquiry in regard to Wood-text and Woodwool slabs	Woodwool
455	M. M. Johnson—Request for advice on relative merits of clay and concrete bricks and the value of the Trulline brick-making machine	Concrete blocks
457	Buchan, Laird & Buchan—Request for lightweight aggregates and foamed cement	Concrete
458	J. A. Ashforth—General inquiry on the use of concrete blocks and no-fines concrete	Concrete blocks
459	A. L. Palmer—General inquiry re concrete roofing tiles	Concrete tiles

Reference Number	Title	Classification of Inquiry
461	J. A. Thompson—General inquiry re the manufacture of concrete blocks	Concrete bricks
463	L. A. Hinks—Request for information on no-fines concrete	Concrete
464	Department of Building Materials, New South Wales—Request for testing of specimen clay tile of Indian origin	Clay tile
465	Director of Works, Brisbane—Request for advice re Holiford	Orientation
468	Secondary Industries Division—Request for opinion of various Kwikform products	Building equipment
468A	E. R. Carlson—Request for information on concrete blocks and comment on a design for a concrete flat roof	Concrete
469	Skidmore, Owing & Merrill, Architects, New York—Request for information on precast prefabrication in Australia	Prefabrication
471	Goliath Portland Cement Co. Ltd.—Inquiry re insulating and other characteristics of asbestos cement	Asbestos cement
473	J. P. Nicholas—Inquiry re use of ashes as aggregate in no-fines concrete	Concrete
475	Director of Works, Brisbane—Request for tests on coral aggregate to determine the best method of use in construction on Pacific Islands; samples being obtained for test	Concrete
476	South Australian Housing Trust—Request for advice on use of lime-cement concrete for house foundations to reduce consumption of cement	Concrete
476A	Irish Representative to Australia—Request for information on brick-on-edge construction	Brick
477	J. J. Burrow—Request for comment on a type of concrete veneer construction	Concrete
480	Denaro Blocks Pty. Ltd.—Request for advice on steam curing	Concrete
481	S. G. Robinson—Request for advice on precasting of concrete	Concrete
483	R. A. Sharples—Request for information on insulation of kitchen roofs	Insulation
484	S. G. Alley—Request for rendering on asbestos cement	Rendering
485	Electrolytic Refining & Smelting Co.—Request for advice re changing construction of new works building from brick to no-fines concrete	General construction
487	Telephone Rentals Ltd.—Request for prospect of designing and producing aluminium roofing	Aluminium
499	K. S. Wragge—Request for concrete blocks and shrinkage	Concrete blocks
504	Director of Works, Sydney—Request for advice and experimental work on the selection of rubber flooring to concrete surfaces.	Rubber
506	Building Inspector, Gunnedah—Request for advice re precast metal roofing tiles	Roofing
510	T. B. F. Gargett—Request for information on sand lime bricks	Bricks
512	A. N. Ball—Request for comment on patent system of precast concrete slab construction	Concrete
514	J. B. Wilson—Request for comment on proposal for steel and concrete construction	Concrete
516	J. B. Hill—Request for general advice on pisé construction	Pisé

Reference Number	Title	Classification of Inquiry
517	Director of Works, Brisbane—Request for information on natural lighting with reference to the use of daylight factor protractors	Natural lighting
519	South Aust. Portland Cement Co.—Request for reference on use of lime-cement concrete	Concrete
521	F. E. Taber—Request for information on finishes for concrete floors	Flooring
47/63	Department of Public Works, New South Wales—Request for information on the Department of Public Works, New South Wales to inspect a number of houses on the Westmead Estate in which bricks were disintegrating seriously above and below the D.P.C. level. The matter was subsequently referred to B.M.R.	Bricks
47/65	A. Schabert, Builder—Request was received to investigate the failure of a brickwork lining to a fireplace	Bricks
47/66	L. Roubaudi—Request for comment on a Swiss system of precast construction	Concrete
47/67	Housing Division—Request to test concrete blocks (Jackson's Building blocks)	Concrete
47/69	Meek & Madden, Architects—Request for investigation of mortar in which unslaked lime had been used	Mortar

The witness withdrew.

Walter Hayward Morris, Architect, of Piddie, Thorp, and Walker, practising architects, Sydney, sworn and examined.

227. To the Chairman.—I am aware that the Committee is inquiring into the proposal to erect a Council for Scientific and Industrial Research Administrative Building at Canberra. I was the architect responsible for the plans of the present Council for Scientific and Industrial Research buildings at Canberra. I have inspected the plans of the proposed building. I think the solution shown in these provisions is quite successful. The plan is different from what I remember of the sketch we got out about twenty years ago for the administrative block. I thought I had a copy but found that I have not. Anyway, I think the solution will work in very well with the existing buildings. It is of the same character and the finish is specified to be of the same type, with some slight addition of stone around the windows and the main entrance. The accommodation, I presume, is what is required by the Council for Scientific and Industrial Research, so I can make no comment on that. The external appearance is a good solution. I notice in the draft specifications that the main entrance and windows are to be framed in freestone. I suggest the coping round the parapet might also be freestone. It would add a little to the finish and is a more permanent material. The spacing of the windows at the sides of the building is shown in the same proportion as at the front and they appear to go very close to the internal corner. I can see the necessity to get as much light as possible, but from the perspective it seems that the windows are crammed up. The original plans provided for the connecting lavatory blocks to be of a lesser height than the central block.

228.—To Mr. Connelan.—I do not think you can do much about internal lighting because of the floor area required and the square shape of the building. I do not think anything would be gained from the lighting point of view by bisecting the building with a passage.

To do so would be to split a large room. You would not gain any advantage on the other floor by bisecting it. The stairs would block the passage of light and you would lose room. The stairs are ample. There are stairs in the other buildings.

229. *To the Chairman.*—A damp course is usually attached to steel-frame windows to keep out rain. The cracking of the corners of the parapets of the existing buildings is caused by expansion and contraction of the concrete roof. You could attempt to insulate the roof, covering the insulation with a protective material, such as concrete. The parapet has been built on top of the slab and as the slab expands it is thrown out. I have no suggestions to make about the appearance of the building. It is quite satisfactory, so far as one can judge from a small-scale plan.

I cannot give you first-hand information about brick-laying, but I have been told that bricklayers are laying fewer bricks per day now than they used to lay.

You ask me whether I prefer day labour to contract building. It largely depends on the men working. If you can count on every one doing his job, obviously day labour saves a lot in forecasting what might

happen on a job. It gives you the actual cost as against estimated cost, assuming the work is carried out with the same efficiency as on a contract job.

We are still acutely short of houses. To be able to say that one building should take precedence over housing one would have to determine the importance of the building. This building is to be for scientific research, which is important to the country, and it may be claimed that it is as important as housing.

230. *To Senator Nash.*—You ask me whether I consider that the materials to be used in this building would greatly affect housing. Canberra has its own brick works. It depends on what it is producing. The rest of the material to be used would be mainly concrete and steel window frames. Not many steel window frames are used in houses, but they are in short supply. Some timber will also be used. If bricks are plentiful, the building should not interfere with housing.

231. *To Mr. Conlan.*—The estimated cost of £50,000 for the building is in keeping with present-day costs.

The witness withdrew.