**The Parliament of the Commonwealth of Australia**

**Parliamentary Standing Committee on Public Works**

Report relating

to the proposed

# CSIRO Research Interaction Centre and Biomolecular Research Facilities, Black Mountain, ACT

(Second Report of 1996)

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## MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

(Thirty-Second Committee)

Mr Neil Andrew MP (Chairman)
Mr Colin Hollis MP (Vice-Chairman)

| **Senate** | **House of Representatives** |
|---|---|
| Senator Paul Calvert | Mr Richard Evans MP |
| Senator Alan Ferguson | Mr John Forrest MP |
| Senator Shayne Murphy | Mr Ted Grace MP |
| | Mr Michael Hatton MP* |

* Replaced The Hon Michael Lee MP on 26 June 1996

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| Committee Secretary: | Bjarne Nordin |
| Inquiry Secretary: | Michael Fetter |
| Secretarial Support: | Lynette Sebo |

# EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES

*No. 25 dated Wednesday, 21 August 1996*

## PUBLIC WORKS - PARLIAMENTARY STANDING COMMITTEE - REFERENCE OF WORK - CSIRO RESEARCH INTERACTION CENTRE AND BIOMOLECULAR RESEARCH FACILITIES, BLACK MOUNTAIN, ACT

Mr Jull (Minister for Administrative Services), pursuant to notice, moved - That, in accordance with the provisions of the *Public Works Committee Act 1969*, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for consideration and report: CSIRO Research Interaction Centre and Biomolecular Research Facilities, Black Mountain, ACT.

Question-put and passed.

## PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

### CSIRO Research Interaction Centre and Biomolecular Research Facilities, Black Mountain, ACT

By resolution on 21 August 1996 the House of Representatives referred to the Parliamentary Standing Committee on Public Works for consideration and report the proposed construction of CSIRO Research Interaction Centre and Biomolecular Research Laboratories, Black Mountain, ACT.

### THE REFERENCE

1. The CSIRO proposes to demolish existing laboratory facilities, which are seriously substandard and outdated, and to redevelop the site to construct a high quality research laboratory to meet the Division of Plant Industry's requirements for biological research into the 21st Century.

2. It is planned to incoporate the Division of Plant Industry laboratory into a CSIRO Research Interaction Centre which will offer interactive exhibits illustrating CSIRO research and its application to the community. The Centre will be substantially self-funding in its operations.

### THE COMMITTEE'S INVESTIGATION

3. The Committee received a written submission from the CSIRO and took evidence from CSIRO officials at a public hearing at Parliament House on 11 October 1996. Written submissions were also received from the following organisations and individuals:

- Master Builders Association of the ACT
- Aerial Taxi Cabs Cooperative Society Limited
- ACT Heritage Council
- Australian Heritage Commission
- ACT Fire Brigade
- Commonwealth Fire Board
- ACROD - ACT Division Access Committee
- Environment Protection Agency
- National Capital Authority

- National Capital Attractions Association
- Mr T H Gascoigne - Vice President of the Australian Science Communicators Society
- Telstra - Black Mountain Telecommunications Tower management
- Powerhouse Museum - Sydney
- Museum of Victoria - *Scienceworks*
- Mr Julian Cribb.

4. Prior to the public hearing the Committee inspected the Division of Plant Industry's biomolecular research laboratories and the site proposed for the proposed works at Black Mountain. The Committee also inspected the "Green Machine", which has been established as a cooperative venture between the Division of Plant Industry, the Cooperative Research Centre for Plant Science and CSIRO Corporate Education, to take biological science to school children and the community.

5. A list of witnesses who gave evidence at the public hearing is at APPENDIX A. The Committee's proceedings will be printed as Minutes of Evidence.

## BACKGROUND

### CSIRO today

6. With a staff of 7,000, working in more than 100 laboratories and field stations throughout Australia, CSIRO is one of the largest and most diverse national scientific research institutions in the world. Established in 1926, the organisation and its scientists have created an international reputation for excellence and achievement in basic and applied research. The 2,600 research scientists employed by CSIRO collectively provide expertise in almost every major scientific discipline. This expertise can be drawn upon to meet emergent scientific or technological challenges.

7. It is a multi-million dollar organisation with expenditure in 1995/96 amounting to $708 million, of which $417 million was provided from Parliamentary appropriations. The balance was contributed by industry and other sponsors of research and by the Department of Primary Industries and Energy.

8. Since its inception, CSIRO has undergone numerous organisational changes. Divisions remain the basic business units of CSIRO and are organised largely along science discipline lines, each headed by a Chief, responsible for guiding and evaluating research efforts. At present there are 34 Divisions, with research being directed towards 22 Sectors. A feature of recently introduced organisational changes are these sectors and alliances. Sectors are sets of socioeconomic activities which represent the national economy and its natural resources. Related sets of sectors are grouped into the following five alliances:

- Agribusiness - field crops; food processing; forestry, wood and paper industries; horticulture; meat, dairy and aquaculture; wool and textiles
- Environment and Natural Resources - biodiversity; climate and atmosphere; land and water, marine
- Information Technology, Infrastructure and Services - information technology and telecommunications; infrastructure, measurement standards; radioastronomy; services
- Manufacturing - chemicals and plastics; integrated manufacturing; pharmaceuticals and human health
- Minerals and Energy - coal and energy; mineral exploration and mining; minerals processing and metal production; petroleum.

**Division of Plant Industry**

9. With a staff of 457 directed at seven research programs, the Division of Plant Industry is CSIRO's largest Division. In broad terms, the Division seeks to improve Australia's agribusiness industries through research directed at improving Australia's international competitiveness and resource bases.

10. The headquarters of the Division of Plant Industry is located at Black Mountain in Canberra. Well defined links have been established over many years with other Divisions on the site. These include Entomology, Soils, Environmental Mechanics and Water Resources. The Division is also an integral part of the Co-operative Research Centre for Plant Science within the Research School of Biological Sciences at the Australian National University.

11. Of the seven research programs, four are located at the Black Mountain site. The remaining three are located at:

- Perth - the CSIRO Centre for Mediterranean Agricultural Research
- Sydney - CSIRO Grain Quality Research Laboratory
- Narrabri - CSIRO Cotton Research Unit.

**Importance of research**

12. Australia's agribusinesses generate $22 billion worth of primary products and a $37 billion turnover. Agribusiness industries have unprecedented opportunities for growth and the delivery of high quality products for domestic and export markets, especially to the economic growth centres of Asia. To meet these challenges, the Division of Plant Industry has developed a world class capability in plant science and technology. With the advent of molecular biology, genetic engineering has emerged as a powerful tool which can manipulate complex processes affecting plant productivity and product quality. Genetic engineering has provided the Division with new opportunities for:

- improving pasture nutrition;
- developing novel methods for the control of pests and diseases;
- producing hybrids for a range of significant crop, horticultural and pasture plants - with the incorporation of desirable product characteristics.

13. CSIRO believes that the work in modern biomolecular research being undertaken in the Division of Plant Industry is of a standard comparable with anywhere in the world. A major achievement has been gene shear technology. As well, the Division is a major training ground for future scientists. Some 40 PhD students work in the Division's laboratories.

**THE NEED**

14. CSIRO believes a need exists to replace a disused laboratoratory building at the Black Mountain site with a high quality research laboratory, which will satisfy requirements into the 21st century. CSIRO also believes the construction of a new laboratory building presents an opportunity for the integration of a Research Interaction Centre. This would enhance the CSIRO's image in the community and aid the transfer of research results to end users.

## Existing facilities

15. The now disused single storey laboratory on the site was constructed in 1957 as a temporary facility to support field-based research. The building occupies a prime position in the comparatively small precinct allocated to the Division of Plant Industry. CSIRO believes the building has reached the end of its useful life as a laboratory facility. It is subject to leakage during heavy rain and vermin infestation. Structurally, the building exhibits significant cracking. Functionally, the small, compartmentalised laboratories are unsuitable and inappropriately serviced for modern biomolecular research. Furthermore, the building is outdated for contemporary laboratory practices and does not comply with occupational health and safety and fire protection measures. Former occupants of the building are scattered over a number of buildings on the site which has caused overcrowding.

16. Other adjacent structures, such as glasshouses, are in most respects below current standards and are inadequate for the Division to effectively undertake its research programs.

17. The Committee questioned the feasibility and practicalities of refurbishing the existing disused building. CSIRO advised that, apart from the problems of cracking, vermin, leaks and small laboratories, the single storey building occupies what is considered to be a significant area. The building footprint is too small to meet requirements and laboratory needs would require its size to be doubled. CSIRO studied the practicalities of refurbishment. The conclusion was that any refurbishment would effectively require demolition of the building - as it is structurally unsound and the cost of refurbishment would be similar to the cost of a new building of double the size.

## Staff amenities

18. A small cafeteria is located within the Division's headquarters building. With more than 900 staff on the site, CSIRO believes this is inadequate.

## Research Interaction Centre

19. CSIRO believes there is a need for a purpose-designed Research Interaction Centre at the Black Mountain site. During the site inspection, the Committee was impressed by the "Green Machine". This is a series of laboratories and classrooms where teachers and students of all ages from all over Australia are given the opportunity to hear lectures on contemporary scientific issues and breakthroughs and to gain practical knowledge from a multitude of experiments and exhibits on display. This facility is housed in a small, demountable building.

## Committee's Conclusions

**20. Existing CSIRO research facilities for biomolecular research at Black Mountain are inadequate, dispersed, overcrowded and do not meet contemporary occupational health and safety standards.**

**21. There is a need to provide modern research facilities for biomolecular research to enable the Division of Plant Industry to continue research programs aimed at benefitting Australia's multi-billion dollar agribusinesses.**

**22. Facilities for staff working at the Black Mountain site are inadequate.**

**23. A Research Interaction Centre, integrated with new biomolecular research laboratories, would provide opportunities for the CSIRO to publicly display the results of research being undertaken by all Divisions and heighten the profile of the organisation and the scientists who make a major contribution to Australia's scientific research efforts.**

## THE PROPOSAL

24. The proposal involves the construction of new biomolecular research laboratories integrated with a CSIRO Research Interaction Centre on the Clunies Ross Street frontage at the Division of Plant Industry site on Black Mountain. The new integrated complex will include research laboratories, support offices, instrument areas, support services and utility rooms, conference facilities, staff and public cafeteria, exhibition and display areas and a science education centre.

25. The laboratories will be designed to accommodate 78 staff and a number of visitors and students. The research to be carried out in the proposed laboratories will focus on the transfer of gene technology to Australian agriculture. The Division has the capability of adding genes which will provide disease resistance, quality improvement, yeild improvement and tolerance to cold or heat. This will provide Australian agriculture with greatly improved crop and pasture plants.

26. The Interaction Centre will have a permanent staff of five, supplemented by voluntary workers and guides. CSIRO advised the Committee that 230,000 people will visit the centre in its first two years of operation. Conference facilities to be provided will be capable of hosting a variety of events with up to 150 participants. They will be able to use the cafeteria and display areas.

27. Staff from nine Canberra-based Divisions will be directly involved in, and benefit from, the flow-on advantages to be derived from the Research Interaction Centre. Furthermore, other Divisions from across Australia will participate in the

activities of the Centre. This will provide the CSIRO with an integrated focus for its work in support of Australian industry.

28. The site amenities, conference facilities and cafeteria will serve more than 900 staff located at the Black Mountain site. CSIRO estimates that a further 700 staff located in other parts of Canberra will benefit from the services to be provided in the new facility.

**Canberra location**

29. The Committee questioned the location of the proposed complex in Canberra. CSIRO believes Canberra to be an excellent location for a facility such as is proposed. The CSIRO corporate headquarters is located in Canberra, a number of the CSIRO's significant customers, such as rural research corporations, also have their headquarters in Canberra. The proposed facility will be in the vicinity of the Australian National University, the National Botanic Gardens and the Black Mountain Telecommunications Tower - and all of these attract considerable tourist numbers. For these reasons, CSIRO believes the best location for the facility is at the Black Mountain site.

**Support for Research Interaction Centre**

30. A number of submissions expressing strong support for the inclusion of the Research Interaction Centre were received from organisations with similar ojectives to foster interest in science and display Australia's achievements in science.

31. The Powerhouse Museum strongly supports the proposal. In a recent publication released by the Museum, the CSIRO was acknowledged to have had major involvement in the development of 41 of the 346 most significant Australian industrial innovations. The Museum believes this is a proud record which deserves to be publicised in order to gather the recognition and support necessary for ongoing success. For these reasons, the Research Interaction Centre will provide information about developing technologies to millions of Australians and visitors from overseas. The Centre will be well equipped to explain how Australian science is integral to the development of new technologies and the future wealth of Australia.

32. Similarly, the *Scienceworks* of the Museum of Victoria, believes the Centre will provide an excellent forum to showcase the work of the CSIRO to the public and facilitate an understanding of the significance of the work being undertaken by Australia's best scientists and researchers.

33. Telstra, owners of the Black Mountain Telecommunications Tower, also expressed strong support. A close relationship between three tourist attractions

(the Telstra Tower, the National Botanic Gardens and the Centre), would provide sight seeing and learning opportunities for tourists and visiting school groups. Telstra pointed to its own experience in using public exhibitions in the Black Mountain Tower to convey a positive corporate image. The Centre will provide the opportunity to show visitors that the CSIRO is not only keeping up with the developed world in scientific investigation, but that it is also at the leading edge of scientific research.

34. Science writer, Mr Julian Cribb, advised the Committee that it is important to communicate science in schools, through the media and other channels. It is also vital to give people hands on experiences with science and research. Mr Cribb believes the Centre, which will feature real science and not mere displays, will play a unique role in this respect.

35. Vice President of the Australian Science Communicators Society, Mr T H Gascoigne, believes Science Centres, which have supplanted old static displays in museums, have proved popular and relevant. They offer experiences and explanations for many basic scientific mysteries and therefore the proposed CSIRO Centre would be a valuable supplementation to these centres. He believes it to be entirely appropriate for Australia's major research organisation to have a facility to display its research and the benefits derived from this. The proposed Centre will focus heavily on the benefits of research. The complex will contain: a biology laboratory, conference centre; function centre; staff facilities, demonstration laboratories; and the interactive exhibition hall.

36. The National Capital Attractions Association believes the Centre will add to the attraction of science for young people and will complement existing science-related attractions in Canberra, such as Questacon and the Australian Science Festival. It will further the image of Canberra as an excellent tourist destination with its blend of science and technology in a bush setting.

**CSIRO public interaction programs**

37. The Committee questioned the extent to which the CSIRO was more actively heightening community awareness of its work. CSIRO advised that over the past decade, efforts in the public interaction area have increased considerably. The tenth birthday of the Double Helix Club, a children's science club, was celebrated recently. There has been a need to to transmit results of scientific reaserch into the field where they are actually used, and consequently there has been increased interaction with customers. The "Green Machine" is a further example of CSIRO becoming involved in science education programs.

**Expected visitors**

38. The Committee questioned the CSIRO about the expected number of visitors to the Centre. CSIRO advised that two market research organisations had undertaken market analysis which indicated that about 230,000 visitors will visit the Centre during the first two years of operations. The operations of the Centre will be cost neutral. Revenue gained from admissions, $5.00 for adults and $2.00 for children, and from the cafeteria and CSIRO shop, will cover the operational costs of the centre.

39. The Committee also questioned the CSIRO about the capacity of the proposed centre to handle more than the expected annual number of visitors. CSIRO believe that the Centre will have capacity to cope with 30 per cent more than the number of visitors expected during the first two years of operation.

**Committee's Conclusions**

**40. The provision of the Research Interaction Centre has strong support from organisations and individuals with an interest in fostering public knowledge of CSIRO achievements in science.**

**41. Market research indicates that the Research Interaction Centre will attract more than 100,000 visitors annually.**

**42. Based on admission charges, the Centre will be self-funding.**

**Site**

43. The CSIRO complex at Black Mountain occupies 37.4 hectares. The site, which is visible from various locations in the central area of Canberra, occupies a bushland setting on the eastern slope of Black Mountain.

44. The proposed building complex will be located on the Clunies Ross Street frontage between the existing Plant Molecular Biology Building and the Phytotron. Services to the site - including water, natural gas, sewer and electricity, have adequate capacity to serve the new complex. The Committee was advised that geotechnical investigations have indicated that the foundation material is sandy clay, sandy gravelly clay and silty sand clay of low to medium plasticity. It is considered that this will provide suitable bearing capacity for the new building complex.

45. CSIRO believes locating the Research Interaction Centre in Canberra, as part of the new laboratories, will provide the opportunity to attract visitors. The Black Mountain site is located on the main tourist route and the centre will form

part of an innovation precinct encompassing the Australian National University, Telstra Tower and the Australian National Botanic Gardens.

**Committee's Conclusion**

**46. The location of the proposed complex makes good use of space available within the Division of Plant Industry precinct.**

**Planning and design**

47. The building will be sited to make the best use of the topography. At the point of entry, the building will be two storeys. The site cross fall will enable a third level to be provided beneath the laboratory wing. Overall, the height and scale will be consistent with adjacent buildings and will also accord with the requirement for the height to be below the level of the existing mature tree canopy.

48. The proposed complex will have a gross floor area of 6,450 square metres and will comprise three functional elements. Two wings will be separated by a central glazed public atrium. The major functional areas within the building will comprise:

- new biomolecular research laboratories and service areas for the Division of Plant Industry - 2,700 square metres;
- Black Mountain site amenities - a conference facility with seating for 150 persons, a 100 square metre shop, banking or commercial facilities and a staff cafeteria with seating capacity for 150 patrons; and
- Research Interaction Centre - 1,000 square metres and a 200 square metre Science Education Centre.

**Design concept**

49. The design which has been adopted involves the establishment of two wings, separated by a central glazed atrium. This links the wings and will provide a focus to the building. The southern wing will be a two storey building and will house the cafeteria, shop, conference venue, banking facilities and the Science Education Centre. The northern laboratory wing will be three storeys.

50. The main axis of the new building will run east-west. This arrangement will mean that laboratories will face to the south and service areas to the north. The orientation is similar to other buildings on the Black Mountain site.

51. The central glazed atrium, which will provide natural daylight to the laboratory work areas, will also serve as the main public acess. From a distance, it will allow visitors to view scientists at work.

52. Public entry to the building will be from North Science Road, which is within the CSIRO site. Visitors will enter the building via a bridge link which arrives at a central control point adjacent to the atrium. From the control point, access will be gained to the conference facility and the Interaction Centre and display areas.

53. The conference facility will be located on the main floor, and will seat 150 people over nine tiered levels as well as a flat floor space at the front for smaller gatherings. CSIRO credit/banking facilities will be located on the lower plaza level, with direct access from the north lower plaza and the new southern carpark.

54. The laboratory wing will be located on the northern side of the building, close to the existing Biomolecular laboratories, with laboratory areas being on the south side. This will provide ideal natural light conditions for the laboratories whilst also permitting public viewing of the laboratories from the garden atrium. Laboratory staff and visitors will access the laboratories from the north at a point mid-way along the building. This will minimise internal circulation distances.

55. CSIRO staff will have direct access to the cafeteria, which will be located on the main floor, with views over the central garden atrium and towards the east, over Canberra's Civic area. An elevated outdoor terrace area, adjacent to the cafeteria, will provide panoramic views of the Australian National University, Mount Ainslie and Parliament House. The cafeteria will serve CSIRO staff, visitors to the Interaction Centre and the adjacent conference facility.

56. The Interaction Centre will be located at the lower level, beneath the laboratories, adjacent to the central atrium. Part of the central atrium could also be used for exhibits.

57. The Science Education Centre will be located at the lower level, beneath the cafeteria, on the southern side of the atrium.

**Committee's Conclusion**

**58. The design concept integrates the proposed laboratories, Research Interaction Centre, conference facilities and staff amenities in a functional manner.**

## CONSTRUCTION DETAILS

59. Construction details for the proposed complex are at APPENDIX B.

## MASTER PLANNING AND FUTURE DEVELOPMENT

### Master Plan

60. The proposed works, which are consistent with the endorsed Black Mountain Site Masterplan, will consolidate buildings on the site and rationalise services and establish an infrastructure for common access and servicing.

61. Much of the research undertaken on the site is in the national interest. Future trends in the effective use of Australia's natural resources and the sustainability of production systems will require an increased need for scientific information and advice to Government and industry. CSIRO, by its establishment of consolidated research centres such as Black Mountain, will contribute greatly to this end.

### Future development

62. The proposed buildings have been sited to allow for future expansion, if required. Potential exists to expand the building, particularly the display areas, if demand is such that expansion is necessary.

## ROADS AND CARPARKING

63. The existing road system interfacing the new facility will generally be retained in its present location with enhancements being made to improve safety for vehicles and pedestrians using the area.

64. Improvements will include:

- the construction of a roundabout at the top of Julius Road to provide improved vehicle operation and legibility of the street network;
- the realignment of the present access road between the roundabout at the intersection of Dickson Way and North Science Road to improve traffic movements;
- the provision of a turn-around at the north end of North Science Road to allow buses, service vehicles and other vehicles ease of access to the new and existing facilities;

- the closure of the present access road from Clunies Ross Street to the southern carpark as part of the Department of Urban Services and National Capital Authority's desire to reduce the number of intersections between CSIRO and Clunies Ross Street;

- the establishment of a new intersection on Julius Road to link the southern carpark to the internal CSIRO road system;

- 68 new carparks to be constructed for the new facility. Approximately 130 existing informal and formal carparks used by CSIRO staff will be lost as a result of the new building. However, a site carparking study has indicated that unused spaces further up the CSIRO site can be utilised to replace those lost; and

- parking for 3 tourist coaches to be provided along North Science Road, with overflow parking available on Julius Road.

65. The Committee questioned the planning basis of traffic and carparking on the site. CSIRO advised that a traffic study had been undertaken to assess the impact of the development on traffic and parking on the entire CSIRO site. From that assessment, CSIRO believes adequate numbers of carparking bays and bus parking bays will be provided to satisfy the ongoing requirements of visitors to the site.

**Covered front door access**

66. Aerial taxi cabs submitted to the Committee that the design of the road system should make provision for set down and pick-up facilities at the front entrance. CSIRO advised the Committee that covered access to the front entry was considered during a value management review. The review concluded that the additional cost associated with specific covered access from the road to the front door was not warranted on economic grounds. CSIRO also advised that the design concept is mindful of the need for set down and pick-up facilities at the front entrance. The entry forecourt paving will be extended across North Science Road to delineate the entry, to provide a pedestrian link with the bus lay-by, and to provide a drop off point for taxis and cars.

**Committee's Recommendation**

**67. Further consideration needs to be given to the provision of covered access to the complex from the kerbside to the front entrance.**

## FIRE PROTECTION

### Scope

68. The fire protection for the facility will comprise:

- a wet pipe fire sprinkler system throughout;
- smoke detectors adjacent exits, return air openings and fire smoke doors;
- Emergency Warning and Intercommunication System (EWIS) to all areas to meet appropriate codes and standards.
- the glazed areas in the wall between the laboratory and atrium, and exhibition space and atrium, protected at each level by window dousing sprinklers to provide satisfactory fire resistance levels;
- a new Fire Indicator Panel to be located within the Main Entry Foyer on Level 1, connected directly to the Fire Brigade;
- photo-optical smoke detectors will be placed in the following locations: outside the common return air openings, adjacent to doors on magnet hold open devices and adjacent to required exits on each floor;
- electromagnetic door hold open devices to be provided on main traffic doors which are required to close upon a fire alarm; and
- an Emergency Warning and Intercommunications System in areas as required to meet Codes and Standards. The system would have one main panel at the building main entry. Recessed ceiling speakers would be used where possible and Warden Intercommunication Points (WIPs) will be located on each level near required exits.

### Regulations and Standards

69. The fire protection services will be designed to suit requirements of the following regulations, standards and local organisations:

- Building Code of Australia including *Amendment 9*;
- Relevant Australian Standards;

- ACT Fire Brigade; and
- ACT Electricity and Water.

### ACT Fire Brigade

70. At the time of the public hearing, the ACT Fire Brigade was in consultation with the CSIRO on the fire safety aspects of the proposed development. The Brigade advised the Committee of its confidence that, when completed, the facility will comply with the intent of the BCA and all relevant Australian Standards.

### Commonwealth Fire Board

71. The Commonwealth Fire Board advised the Committee that the proposed fire protection measures meet all fire safety standards required to adequately preserve life, Government assets and business activity.

## SECURITY

72. CSIRO advised the Committee that a security risk analysis has been initiated for the physical and intellectual security of the site. The recommendations from the analysis, including control of access to the site, perimeter security of buildings and detection within critical areas, will be considered and incorporated, where necessary, in the design and construction of the complex.

73. The existing security and access control system, installed throughout the site, will be upgraded to serve the new building. The security system will comprise card reader door controls, motion detectors throughout passageways and magnetic switches to all external doors and windows.

74. Facilities requiring restricted access, such as laboratories, will be provided with an access control system to restrict access to authorised persons and monitor access to the area.

## CONSERVATION MEASURES

75. Passive energy conservation measures have been incorporated into the building and landscape design. As well, active measures will be incorporated in the mechanical, electrical and hydraulic design.

76. Energy conservation measures will include:

- orientation of buildings towards the north to maximise passive solar energy. The siting and massing of the new building have

taken into account the need to maintain sun penetration without shadowing to the adjacent Phytotron Building at all times of the year;

- use of adequate and efficient insulation in the roof and to the walls to reduce ambient internal heat gain or loss;
- tinted solar control glass in external windows to reduce direct transmission of solar heat load to the building interior - this will reduce cooling loads on the mechanical system;
- sunscreening to north facing windows of the laboratory building and to the east and west facing glazed atrium walls;
- separate air handling plants for laboratories and other spaces to allow independent control and operation out of hours;
- selection of cost effective and energy efficient mechanical plant; and
- use of long life, low energy light fittings, together with having lighting controlled to only require usage in occupied areas.

77. Water conservation measures will include:

- provision of water flow restriction devices on all taps; and
- use of dual flush cisterns and flush-on-demand cisterns to urinals.

## CHILD CARE

78. In 1991, following a survey of Canberra-based CSIRO staff, CSIRO established a centrally located work based creche/child care facility for its employees in the Canberra region at the Black Mountain site. The facility is highly regarded by both CSIRO staff and the general community. No additional child minding or creche facilities are proposed in the new complex.

## ACCESS FOR PEOPLE WITH DISABILITIES

79. CSIRO advised the Committee that an access policy has been established for the complex to ensure that access for people with disabilities meets the requirements of the Building Code of Australia and relevant Australian Standards. Facilities to be incorporated into the development will include carparking, continuous pathway access, lift, disabled toilets and showers and clear signage.

80. The ACROD ACT Division Access Committee advised that designers and builders should be aware of the need to comply with the expectations and obligations of the Disability Discrimination Acts. These require non-discriminatory access to facilities and services. The requirements are not spelt out specifically in the BCA, but have been defined through common law actions. Additionally, Commonwealth employees are subject to the *Safety Rehabilitation and Compensation Act 1988*, which encourages employers to assist the rehabilitation of injured employees.

81. ACROD also made a number of useful suggestions regarding designated disabled carparking bays, the location of disabled toilets, the size of lift cars, and wheelchair access to the conference theatre. CSIRO reiterated that all areas of the complex will be accessible to the disabled, and that access to facilities and services will be non-discriminatory, with a commitment to continue consultations with ACROD during the on-going design development of the project.

## CONSULTATION

### Extent

82. CSIRO advised the Committee that a significant number of authorities and departments, both Commonwealth and Territory, were contacted and consulted during the development of the proposal.

### Planning and design approvals

83. The site is "National Land" within a "Designated Area" of the National Capital Plan. In accordance with subsection 2(1) of the *Australian Capital Territory (Planning and Land Management) Act 1988*, works in designated areas require the written approval of the National Capital Authority.

84. The Committee was advised by the National Capital Authority that the site is identified for a "Community Facility" and the proposal is consistent with this use. The Authority was consulted throughout the development of the project.

85. CSIRO advised the Committee that these consultations will continue during the further development of the project.

### Support from CSIRO staff

86. The Division of Plant Industry Consultative Committee, which is the principal forum for industrial participation within the Division, indicated wholehearted support for the project and advised the Committee that:

- it had been kept fully informed about the proposed Research Interaction Centre and Biomolecular Research laboratories;
- it enthusiastically endorses the project in total;
- the new laboratory and site amenities are seen as long overdue;
- the Science Interaction Centre is an exciting concept which will allow the CSIRO to showcase its research effort to the general public and industry; and
- the communication link between CSIRO researchers and the community at large is viewed by the Consultative Committee to be a vitally important role for the organisation.

## ENVIRONMENT AND HERITAGE

### Environment

87. The Commonwealth Environment Protection Agency (CEPA) advised the Committee that the CSIRO had provided preliminary information about the proposal. Based on this information, CEPA concluded that the provisions of the *Environment Protection (Impact of Proposals) Act 1974* would be unlikely to apply as the proposal will not impact upon the environment to a significant extent.

### Heritage

88. The Australian Heritage Commission (AHC) advised the Committee that the proposed development will require the demolition of a number of single storey buildings, surrounding glasshouses and some mature trees. AHC officials visited the site prior the the Committee's inspection. The visit confirmed that the buildings and structures to be demolished do not warrant entry on the Register of the National Estate. The AHC advised the Committee that a large mature elm tree on the site, which will require removal, warrants further investigation. The AHC advised that the age of the tree is indicated by its greater size in comparision with others of the same species in the area. It may predate the CSIRO's assumption of the site and therefore may have cultural significance to Acton Peninsula.

89. The CSIRO advised the Committee that during the design phase, a landscape and tree assessment was undertaken by a qualified consultant. The assessment included a rating of the value of existing trees on the site. The result of the study was that a significant number of trees were rated as having a high value and were to be retained as far as practicable.

90. The study also identified a number of trees of significant historical value, including a copse of bottle trees and a Californian incense cedar - all of which it is believed were planted in the 1920s. These historically significant trees will be retained. CSIRO advised the Committee that the public parking area, adjacent to North Science Road, was re-designed to permit the retention of the bottle trees.

91. The American elm tree, referred to by the AHC, was identified as having a high value. The location of the tree unfortunately conflicts with the proposed building footprint and at this stage it is proposed to be removed. CSIRO believes the tree was planted in 1962 and has no cultural significance to Acton peninsula.

**Dangerous substances**

92. The Committee sought assurances from the CSIRO that practices and measures will be implemented and designed to prevent hazardous substances and material being accidentally discharged or escaping from the new laboratories.

93. CSIRO advised the Committee that there are activities carried out at the site, and the nearby Australian National University, that are potentially dangerous. The use of radioactive isotopes, transgenic material and viruses is governed by very stringent regulations. The Division's Radioactive Safety Committee provides regular inspections of areas where radioactive isotopes are used in research. There is strict control over the amount of radioactivity used in experiments and its disposal.

94. Similarly, the escape of transgenic material is taken very seriously. The Division has a Biosafety Glasshouse which is a quarantine facility where research into viruses and the production of virus resistant plants is conducted. This facility is operated under guidelines promulgated by the Genetic Manipulation Advisory Committee.

**Waste discharge**

95. All gaseous discharges will comply with all requirements of the ACT Environmental Protection Authority. The boilers serving the laboratory complex will be operated under emission conditions and with a fuel approved by the ACT Environmental Protection Authority (EPA).

96. Discharges to air, not covered by EPA requirements, eg. discharge from fume cupboards, have been assessed against safety standards and criteria of Australian and overseas authorities and the ventilation systems will be designed accordingly. All such discharges will be periodically checked and maintained at a sufficiently low level and high rate of dilution to be harmless to humans and to ensure no detrimental effects to the environment.

97. There are four types of liquid effluent from the laboratory complex - human sewage and sullage; liquid chemicals; solvents; and trade wastes. All will be disposed of in a manner acceptable to the EPA and other relevant bodies.

98. Normal domestic wastes will be discharged to the ACT reticulated sewerage systems.

99. Non toxic, aqueous, chemical wastes will be diluted and neutralised in automatic self-dosing type neutraliser pits prior to discharge to the sewer. The rate and concentration of discharge will meet the requirements of ACTEW and will be well within the limits set by the EPA.

100. Any wastes such as solvents, potentially flammable liquids, oils and toxic liquids will be collected at the point of use in waste containers. The containers will be collected and stored in a proprietory, remote and fire-isolated storage and periodically collected for disposal by a licensed industrial waste collector.

101. None of these wastes will be discharged into the reticulated sewerage system or into the ground.

**Electro-magnetic radiation**

102. The design will employ the principle of prudent avoidance to minimise exposure of equipment and staff to very low frequency electromagnetic radiation. Major power cable runs will either be routed or screened to minimise possible effects.

## PROJECT DELIVERY

**Timetable**

103. It is expected that construction will be staged over an 18 month period. Subject to a favourable report from the Public Works Committee and Parliamentary approval, it is planned to commence staged construction in February 1997, with completion by late 1998.

**Quality management**

104. CSIRO advised that Quality Management principles will be applied to all stages of the project delivery process. Quality standards, appropriate to each stage, will be implemented. Value management analysis was applied in developing the initial design concepts and quality reviews and audits will be maintained throughout the ongoing design and construction phases.

**Master Builders Association**

105. The ACT Master Builders Association (MBA) advised the Committee that the project will benefit the local building industry, but questioned the project delivery method to be adopted by the CSIRO. The MBA advised the Committee that ACT budget forecasts indicate a growth trend for local non-residential construction, much of which involves major Commonwealth projects. The local construction industry, expecially at the subcontractor level, has in the past and will continue to have difficulties in accessing these major projects. The MBA believes that Project Management would be an appropriate project delivery mechanism.

106. The CSIRO advised the Committee that the preferred method of construction delivery for its facilities is through a competitive lump sum contract based upon complete, detailed working drawings and specifications. Lump sum tender prices are usually sought from a select list of firms with demonstrated technical capability, relevant experience, managerial expertise, industry performance and financial capacity to construct specialised laboratory facilities to CSIRO's time, quality and cost requirements.

107. CSIRO believes this form of project delivery ensures minimum risk to CSIRO by providing maximum control over design and documentation to meet research user needs, greater predictability of end-cost, and maximum value for money.

108. The CSIRO also advised the Committee that local builders, suppliers and trade subcontractors will derive considerable benefits from the project, with positive flow-on effects to the ACT economy.

**COST**

109. The estimate for this proposal is $17.1 million, inclusive of escalation costs, contingencies and all professional fees. The estimate does not include any costs associated with fitting out of the display areas or Sirocredit facility.

**Committee's Recommendation**

**110. The Committee recommends the construction of the CSIRO Research Interaction Centre and Biomolecular Research Facilities, Black Mountain, ACT, at an estimated cost of $17.1 million.**

## RECOMMENDATIONS AND CONCLUSIONS

111. The Committee's recommendations and conclusions and the paragraphs in the report in which they occur are set out below:

| | | Paragraph |
|---|---|---|
| 1. | **Existing CSIRO research facilities for biomolecular research at Black Mountain are inadequate, dispersed, overcrowded and do not meet contemporary occupational health and safety standards.** | **20** |
| 2. | **There is a need to provide modern research facilities for biomolecular research to enable the Division of Plant Industry to continue research programs aimed at benefitting Australia's multi-billion dollar agribusinesses.** | **21** |
| 3. | **Facilities for staff working at the Black Mountain site are inadequate.** | **22** |
| 4. | **A Research Interaction Centre, integrated with new biomolecular research laboratories, would provide opportunities for the CSIRO to publicly display the results of research being undertaken by all Divisions and heighten the profile of the organisation and the scientists who make a major contribution to Australia's scientific research efforts.** | **23** |
| 5. | **The provision of the Research Interaction Centre has strong support from organisations and individuals with an interest in fostering public knowledge of CSIRO achievements in science.** | **40** |
| 6. | **Market research indicates that the Research Interaction Centre will attract more than 100,000 visitors annually.** | **41** |
| 7. | **Based on admission charges, the Centre will be self-funding.** | **42** |
| 8. | **The location of the proposed complex makes good use of space available within the Division of Plant Industry precinct.** | **46** |

| | | |
|---|---|---|
| 9 | **The design concept integrates the proposed laboratories, Research Interaction Centre, conference facilities and staff amenities in a functional manner.** | 58 |
| 10. | **Further consideration needs to be given to the provision of covered access to the complex from the kerbside to the front entrance.** | 67 |
| 11. | **The Committee recommends the construction of the CSIRO Research Interaction Centre and Biomolecular Research Facilities, Black Mountain, ACT, at an estimated cost of $17.1 million.** | 110 |

Neil Andrew MP
Chairman

7 November 1996

**APPENDIX A**

## WITNESSES

**AGOSTINO,** Mr Anthony, Scientist and Manager, Divisional Research Facilities, Division of Plant Industry, CSIRO, Corner Clunies Ross Street and Barry Drive, Acton, Australian Capital Territory 2601

**FRATER,** Dr Robert Henry, Deputy Chief Executive, CSIRO, Limestone Avenue, Campbell, Australian Capital Territory 2601

**HUPPATZ,** Dr John Lawrence, Assistant Chief, Division of Plant Industry, CSIRO, Corner Clunies Ross Street and Barry Drive, Acton, Australian Capital Territory 2601

**JAMES,** Mr Lindsay Eric, Project Manager, Corporate Property, CSIRO, Limestone Avenue, Campbell, Australian Capital Territory 2601

**MELERO-NICHELE,** Ms Lina, Science Communication Manager, Division of Plant Industry, CSIRO, Corner Clunies Ross Street and Barry Drive, Acton, Australian Capital Territory 2601

**MOODY,** Mr Trevor Laurence, Assistant General Manager, Corporate Property, CSIRO, Limestone Avenue, Campbell, Australian Capital Territory 2601

**SZYDLIK,** Mr Zbigniew Tadeusz, Director, Daryl Jackson Alastair Swayn Pty Ltd, Architects, 49 Jardine Street, Kingston, Australian Capital Territory 2604

**APPENDIX B**

## CONSTRUCTION DETAILS

### STRUCTURE

1. The design for the complex consists of two independent reinforced concrete framed structures with reinforced concrete columns, beams and floor slabs, interconnected with a steel-framed, glazed atrium area.

2. The laboratory structure is based on a 9.0 metre longitudinal grid which relates to a 3.0 metre laboratory module and is structurally integrated with the Interaction Centre atrium.

3. Ground Floors will be concrete slab on ground. A number of options have been examined for the upper floors. The preferred approach consists of flat slabs with drop beams which provide greater economy and flexibility for the integration of services.

4. The design of all structural elements will conform with the Building Code of Australia and relevant Australian Standards.

**Design loads**

5. Design superimposed loads will be:

- laboratories - 4.0 kPa;
- exhibition areas on ground floor - 7.5 kPa;
- public area including shop, theatrette, cafeteria - 4.0 kPa; and
- compactus areas - 10.0 kPa.

6. A general allowance of 1.0 kPa has been made for partitions, services and other fittings.

**Roof**

7. The roof will be colourbond sheet steel laid over an insulation blanket and reflective foil sarking on a steel roof structure. Thermal performance to Building Code requirements will be achieved by further bulk insulation at ceiling level.

8. The roof pitch will be a minimum 5 degrees, with pitches running away from the atrium to external eaves gutters.

**Walls, cladding and floors**

9. At lower levels, walls will be masonry with an applied colour render. Upper level walls and fascias will be an economical lightweight pre-finished panel system on steel framing. Lightweight walls will be fully insulated to meet thermal performance requirements.

10. Perimeter windows will receive sun control through prefinished metal sunscreens fixed to the outside of the building.

11. Laboratory services will be exposed on the underside of the slab to facilitate ease of modification and cleaning.

12. Ceilings to other areas will generally be plasterboard, with acoustic treatment as required. The theatrette ceiling will be stepped to assist in acoustic and lighting control. Absorbent acoustic panels will be utilised on the walls as required to maintain correct acoustic conditions.

13. Floors in laboratory areas will be sheet vinyl generally, in accordance with codes and standards.

14. Floors in public areas are to be carpet tiles, to assist in acoustic control and to facilitate ease of maintenance. Kitchen and service areas will be tiled.

## MECHANICAL SERVICES

15. Mechanical services will include:

- air conditioning for comfort conditions in laboratories, offices, conference facility, cafeteria and exhibition/display spaces and Sirocredit facilities;
- limited air conditioning to the lower level areas of the atrium;
- exhaust ventilation systems for toilets, fume cupboards, hoods and specific equipment;
- reticulated natural gas in laboratories; and
- automatic controls for air conditioning and ventilation systems incorporated into an integrated building management system.

16. The mechanical services will generally comply with the following relevant standards and regulations:

- Building Code of Australia including *Amendment 9*;
- Guidelines for Small Scale Genetic Manipulation Work; and
- Relevant Australian Standards including:
  - ◊ AS 2982 - 1987 - Laboratory Construction Code;
  - ◊ AS 2243 - 1992 - Safety in Laboratories;
  - ◊ AS 1668.1 - 1991 - Fire and Smoke Control;
  - ◊ AS 1668.2 - 1991 - Mechanical Ventilation for Acceptable Indoor Air Quality;
  - ◊ AS 2107 - 1987 - Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors; and
  - ◊ AS 3666 - 1995 - Air Handling and Water Systems for Buildings - Microbial Control.

17. The central plant will be located in the laboratory building and will serve all areas.

18. The plant includes:

- natural gas fired heating low temperature hot water boilers and pumps;
- water cooled chillers and chilled water pumps;
- cooling towers and condenser water pumps; and
- air distribution fans.

**Laboratory Air Conditioning**

19. The laboratories, offices and meeting rooms will be air conditioned for staff comfort conditions and equipment requirements. Generally separate air handling plants will be provided on each floor and air provided to laboratories will not be recirculated to other areas.

20. Separate air handling plants will be provided according to thermal zoning characteristics, nature of occupancy and spatial limitations. This will allow optimal plant selection and will permit energy efficient day to day operation.

**Laboratory ventilation**

21. General exhaust ventilation systems will be provided to toilet areas, darkrooms and selected store rooms where required.

22. Specific exhaust systems will be provided to the autoclave and photographic developing areas and within laboratories, where required, for specific equipment.

23. Fume cupboards will be provided in laboratories and research areas. Exhaust fans are generally located at roof level.

24. Reticulated natural gas will be provided to specific laboratory benches and fume cupboards. Where other gases are required, stand alone systems reticulated to the area only will be provided.

25. Prefabricated cool rooms will be provided in the laboratory area, with independent refrigeration equipment.

26. Constant temperature rooms will be provided, with independent fan coil units to allow continuous operation.

**Areas other than laboratories**

27. Air conditioning will be provided to other areas using separate air handling units for each functional area connected to the central plant. This will allow optimal plant selection and will permit energy efficient day to day operation.

28. General exhaust ventilation systems will be provided to toilet areas.

29. A kitchen exhaust hood and duct system will be provided to the cafeteria kitchen.

**Automatic controls**

30. A building management system (BMS) will be provided for automatic control of the mechanical services. This will provide system operation, alarm monitoring and implementation of energy management programs.

## SMOKE AND FIRE HAZARD MANAGEMENT

31. A fire sprinkler system will be installed throughout the building. The proposed smoke/fire hazard management systems will consist of:

- a smoke exhaust system to the atrium, exhibition and cafeteria areas;

- shutdown of the airconditioning systems in the laboratory areas; and
- smoke clearance via fume cupboard exhaust.

## ELECTRICAL SERVICES

32. The electrical and communications services will comprise:

- high voltage reticulation by ACTEW;
- provision of a new indoor sub-station fitted with 2 x 750kVA transformers;
- building of a main switchboard, with submetering to each of the individual tenancies;
- power factor correction equipment;
- distribution boards;
- sub-main cabling and cable supports to mechanical services, lift and distribution boards;
- lighting systems, including exit and emergency lighting;
- external and Security lighting;
- general purpose outlets and special purpose power supplies;
- cable management systems;
- voice and data communications systems;
- audio visual and video conferencing systems;
- electronic security and access control system; and
- lightning protection.

33. Electrical installations, including communications, will be carried out in accordance with:

- Building Code of Australia including *Amendment 9*;
- ACT Fire Brigade;
- AS 3000 - 1991 SAA Wiring Rules; and
- Austel Standards.

34. A 2 x 750kVA indoor transformer installation chamber will be provided to supply the building electrical load. The existing site high voltage reticulation will be modified to supply the new sub-station.

35. A new main switchboard will be provided to the building and located adjacent to the sub-station. Sub-main protection will be provided to reduce the fault level at distribution boards. The main switchboard shall have provision for sub-metering of sub-mains to each of the tenant areas. All switchboards will cater for any future expansion of the facility.

36. Power factor correction equipment will be installed adjacent to the main switchboard to improve the network power factor and reduce energy usage and costs.

37. Distribution boards will be provided at strategic locations to reduce the length of sub-circuit cabling. Circuit breakers will be utilised to protect sub-circuit cabling and be complete with earth leakage protection to laboratory areas.

38. Sub-mains will be run from the main switchboard via underground conduits and then rise through the building to respective distribution boards. MIMS cabling will be used for all essential service loads.

39. A number of cable management systems will be provided to reticulate cabling and provide flexibility for future cabling needs. A combination of cable trays and Unistrut supports will be provided in the Laboratories. Two channel skirting duct will be provided on one wall of offices. A soft wiring system will be utilised to reticulate power cabling throughout the laboratory benches via node boxes located in the benches.

40. Power outlets and permanent power connections will be provided to serve general and specific power requirements. General purpose outlets in laboratory areas will be protected by earth leakage circuit breakers and controlled by an emergency power shut-off switch.

41. Lighting will incorporate long life, energy efficient fittings to provide the illumination levels required. Lamps with a colour rendering index in excess of 80

will be used through all work areas and colour temperature will be warm white (3000°K).

42. Exit and emergency lighting will comprise single point units with integral batteries and charging equipment. A manually initiated test facility will be provided at every distribution board to test the emergency lighting without the need to interrupt the normal lighting.

43. Lighting to each section of the building shall be locally controlled by bulk manual switching. Passive infra-red detectors will be used to activate/deactivate lighting to infrequently used rooms. Dimming will be provided to the conference facility with interface to the audio visual and video conferencing system.

**Communications system**

44. An integrated voice and data communications system will be provided, comprising Category 5 shielded twisted pair cabling and patch panels and RJ45 outlets.

45. The incoming data service will comprise a 12 core fibre optic cable run from the computer room in Building 73. The incoming voice service will comprise a multi core 200 pair copper cable run from the existing PABX in the site Library (Building 60).

46. A combined Audio Visual/Video Conferencing System will be provided to the conference facility to allow audio and video communication between the conference room, local buildings and remote sites. The system will comprise an AMX audio visual controller and a PC based rollabout video conferencing system.

**Lightning protection**

47. A lightning protection system will be provided to the total complex to protect the building structure and equipment. The protection will be achieved by bonding the metal roof and wall structures to building footings in compliance with AS 1760.

## HYDRAULIC SERVICES

48. The hydraulic services will include:

- water supply services;
- sanitary drainage, plumbing and sewer;
- stormwater drainage;
- laboratory drainage and plumbing and trade waste treatment; and
- internal hot and cold water reticulation.

49. All hydraulic services will be designed and constructed in accordance with the Building Code of Australia, Australian Standards and Authority (ACT Government, ACTEW and ACT Fire Brigade) requirements.

50. The existing reticulated ring main system has suitable capacity to cater for the new building's water and fire fighting demands.

51. This system will be diverted and extended to supply the fire sprinkler system, fire hydrant/hose reels and domestic water services.

52. Sanitary drainage from wet areas in the building will be connected to the existing sewer mains on the site.

53. New stormwater mains will be provided to drain the building complex and adjacent roads and carparks.

54. Downpipes will be sized to cater for a one in twenty year average recurrence interval.

55. Provision will be made to divert surface drainage around the buildings for 1 in 100 year overland flows.

56. Cold water supply will be reticulated to all sanitary plumbing fixtures, laboratory equipment, and mechanical services equipment as required.

57. Domestic hot water supply will be delivered via central storage gas water heaters located in the plant room.

58. The design will allow for a flow and return system incorporating a circulating pump at the water heater to ensure minimal draw-off to all fixtures.

59. Use of solar assisted gas boosted hot water heaters has been assessed by comparing capital cost to recurrent cost savings per annum, and it has been determined that the payback period would exceed the life of the equipment, making the proposal non-viable.

## LIFT SERVICES

60. A 16 person passenger lift will provide access to all levels of the building. It will be located to the north of the entry point so that it can be used by both laboratory staff and visitors to the Centre and also provide access for the disabled.

## ACOUSTICS

61. Background noise levels from Mechanical plant will be in accordance with Australian Standards. Partition design will be suitable for appropriate levels of speech privacy and plant/equipment noise isolation. Noise levels in the various occupied spaces, especially in noise sensitive areas, will meet or exceed Australian Standards Guidelines and good acoustic practice.

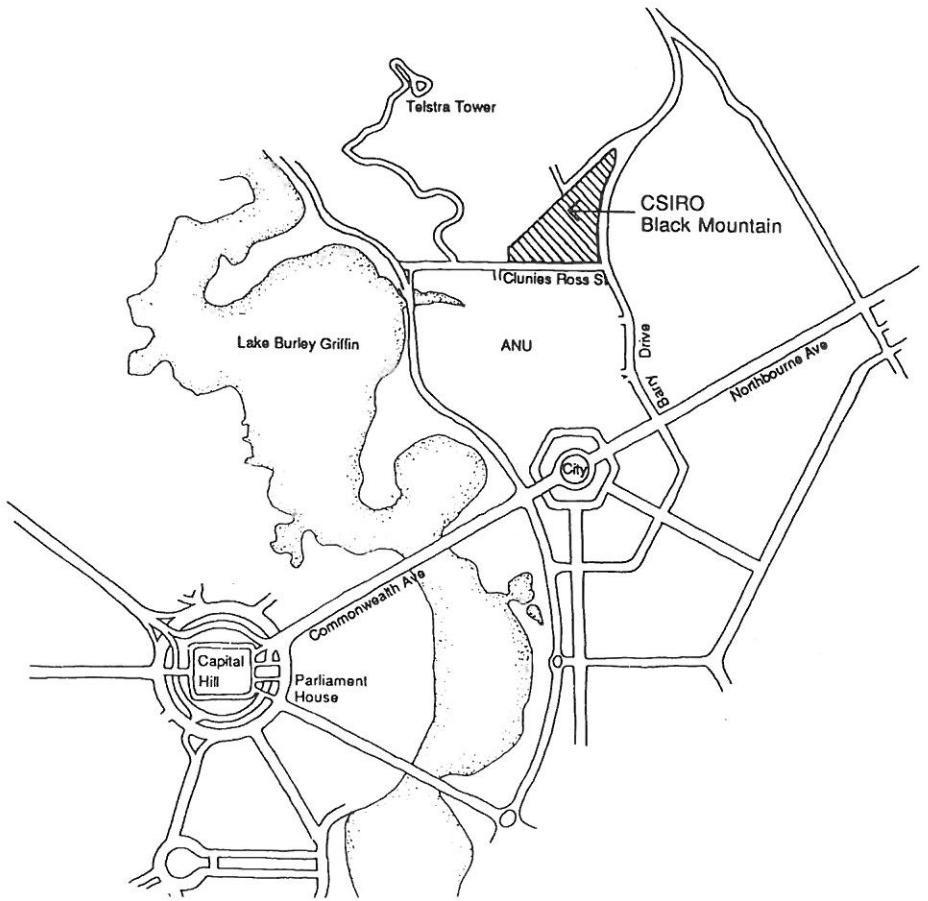
**APPENDIX C**

## PLANS, SECTIONS, ELEVATIONS AND PERSPECTIVES

1

# SITE LOCALITY PLAN

AUGUST 1996




C - 1

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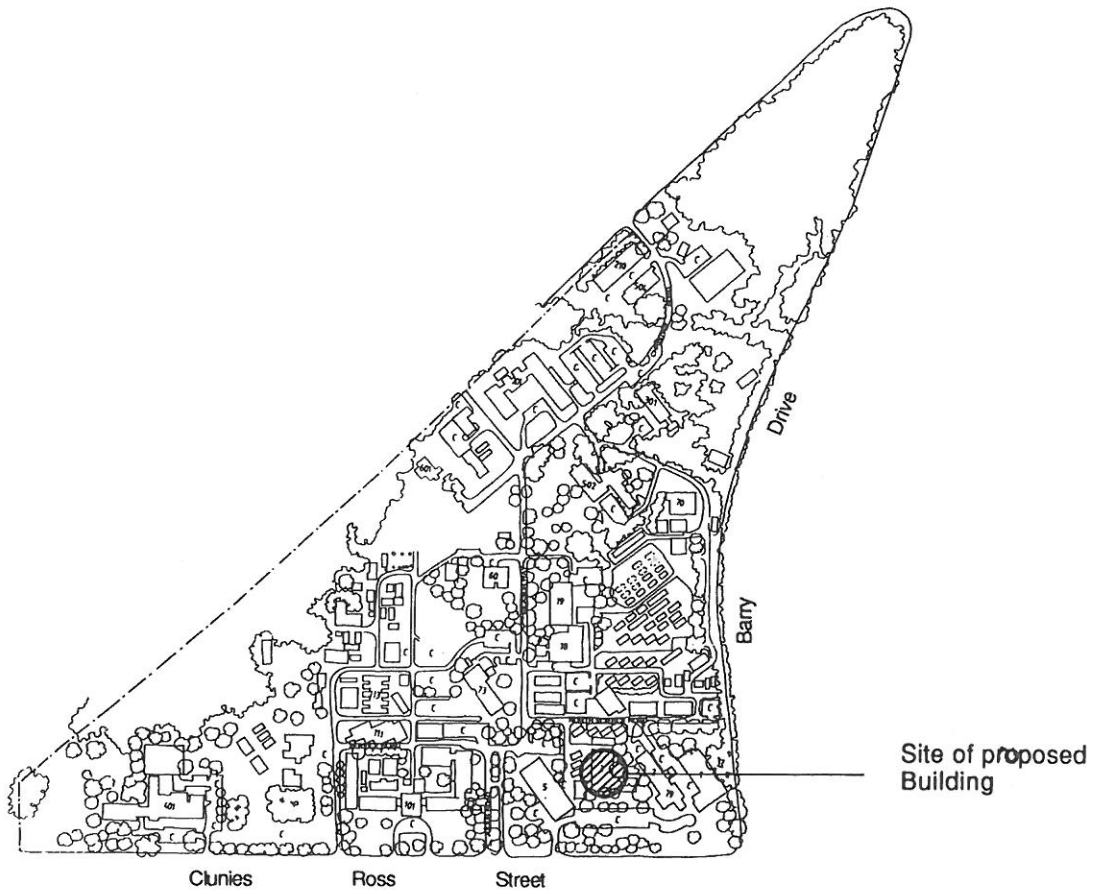
# 2 SITE PLAN - BLACK MOUNTAIN

AUGUST 1996

N

PRINCIPAL STRUCTURES

| | |
|---|---|
| 1 | Agronomy |
| 2 | Biochemistry |
| 3 | Biology Lab |
| 5 | Phytotron |
| 18 | Workshops |
| 19 | Pye Lab |
| 60 | Library |
| 70 | Potting Shed |
| 73 | Crop Adaptation |
| 79 | Molecular Plant Biology Lab |
| 101 | Entomology |
| 111 | Workshops |
| 113 | Glasshouses |
| 201 | Water Resources |
| 210 | Workshops |
| 301 | Soils |
| 401 | "Paxus" |
| 502 | Herbarium |
| 504 | Workshops |
| 601 | Child care |

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# DEVELOPMENT PLAN

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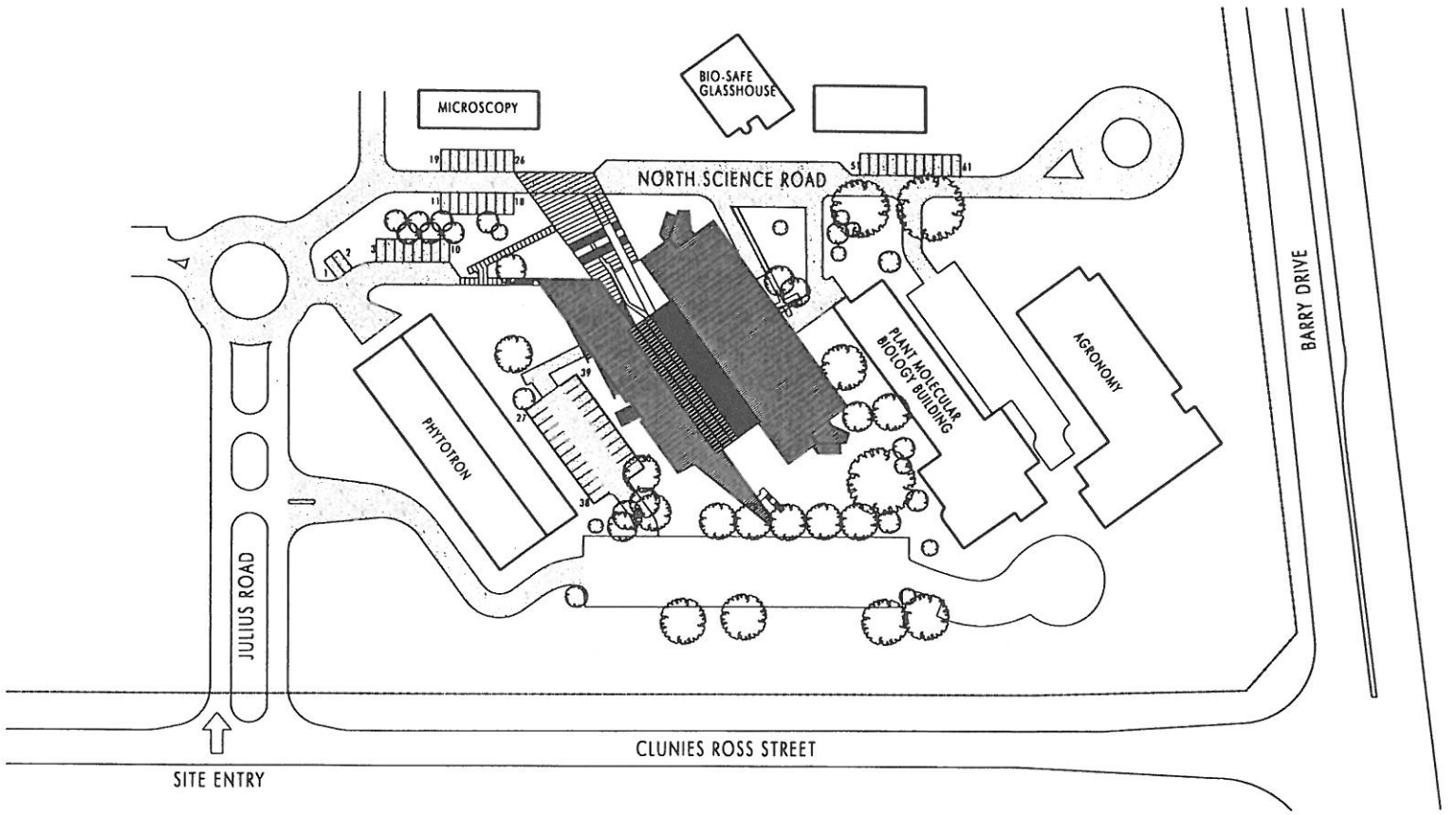


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# FLOOR PLAN LEVEL 1

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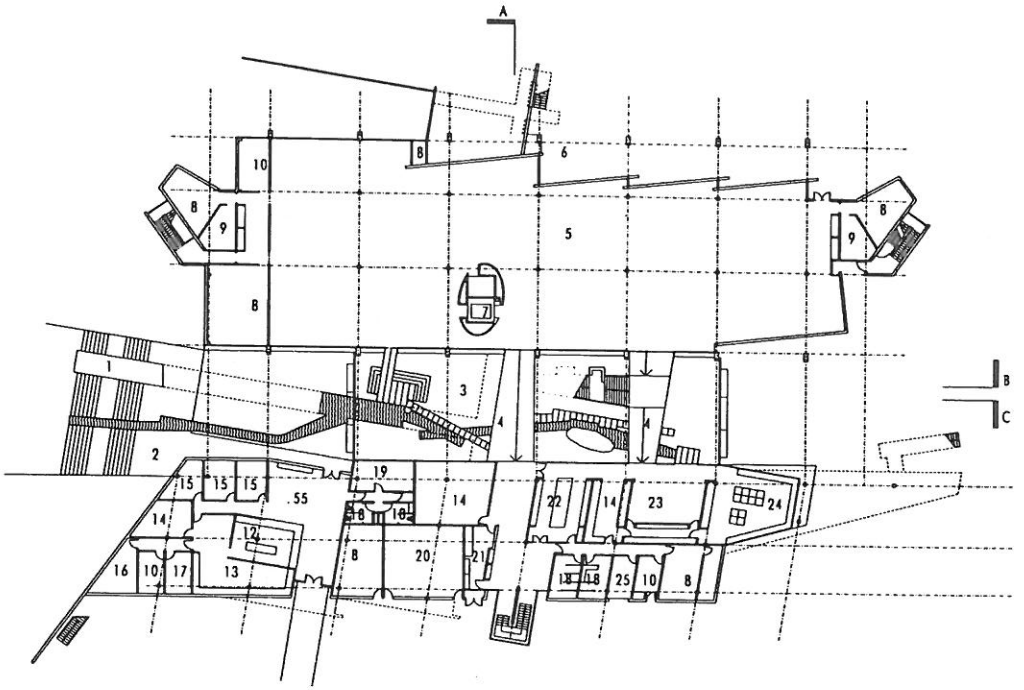


1 ACCESS BRIDGE
2 LOWER FORECOURT WITH WATER FEATURE
3 ATRIUM & EXHIBITION SPACE
4 BRIDGE
5 EXHIBITION & DISPLAY SPACE
6 LOADING DOCK
7 LIFT
8 PLANT ROOM
9 COMMUNICATION ROOM
10 STORE ROOM
11 LOBBY
12 TELLERS
13 LOANS AREA
14 OFFICE
15 INTERVIEW ROOM
16 FILING
17 EQUIPMENT ROOM
18 W/C
19 STAFF ROOM
20 SUBSTATION
21 MAIN SWITCH ROOM
22 SENIOR LABORATORY
23 DEMONSTRATION AREA
24 JUNIOR LABORATORY
25 REFUSE STORE
26 RECEPTION DESK
27 SHOP
28 CONFERENCE THEATRE
29 BIO BOX
30 CAFE DINING
31 SERVERY
32 KITCHEN
33 TERRACE
34 SEMINAR ROOM
35 MEETING ROOM
36 SICK BAY
37 LABORATORIES
38 CENTRAL SERVICES & EQUIPMENT AREA
39 TISSUE CULTURE GROWTH ROOM 1
40 TISSUE CULTURE GROWTH ROOM 2
41 LAMINAR FLOW CABINET LABORATORY
42 STUDY
43 DELIVERY ROOM
44 SOLVENT STORE
45 COMPUTER ROOM
46 COOL ROOM
47 RADIO CHEMICAL LABORATORY
48 PHOTOGRAPHIC PROCESSING ROOMS
49 WASH ROOM
50 INSTRUMENT ROOM
51 CULTURE ROOM
52 PHOSPHO / IMAGING LAB
53 SEQUENCING ROOM
54 TEA ROOM & LIBRARY
55 PUBLIC AREA

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# FLOOR PLAN LEVEL 2

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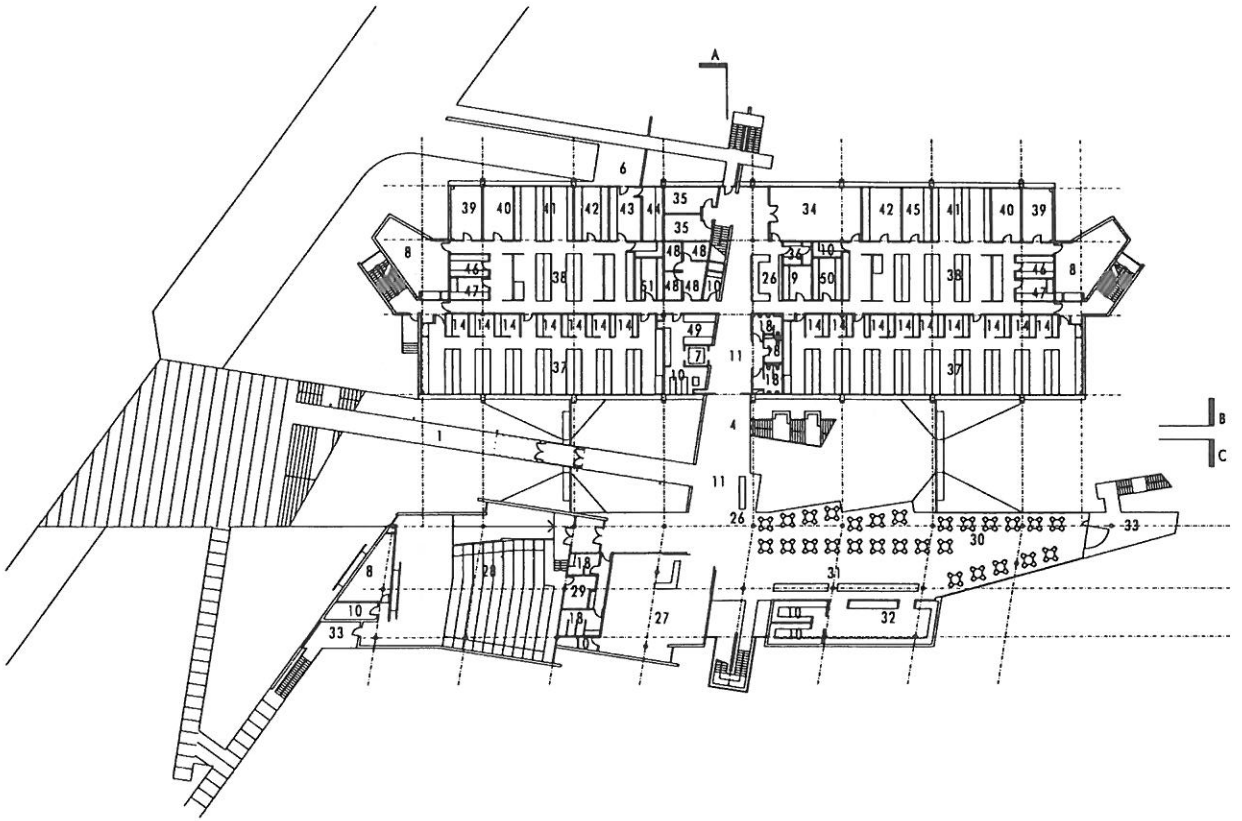


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48 PHOTOGRAPHIC PROCESSING ROOMS
49 WASH ROOM
50 INSTRUMENT ROOM
51 CULTURE ROOM
52 PHOSPHO / IMAGING LAB
53 SEQUENCING ROOM
54 TEA ROOM & LIBRARY
55 PUBLIC AREA

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C-5

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# 6 FLOOR PLAN LEVEL 3

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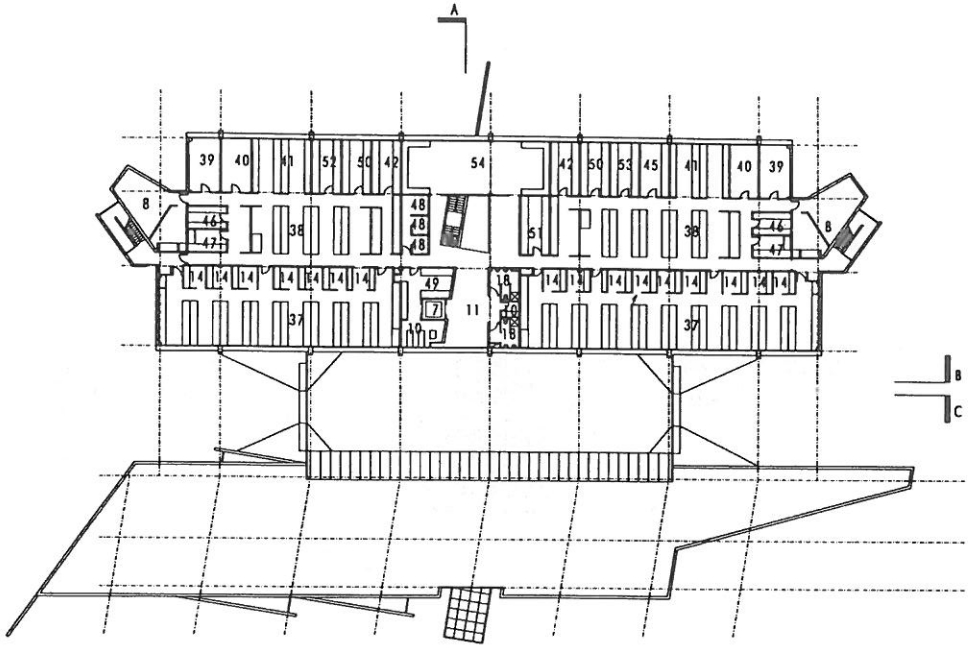


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48 PHOTOGRAPHIC PROCESSING ROOMS
49 WASH ROOM
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51 CULTURE ROOM
52 PHOSPHO / IMAGING LAB
53 SEQUENCING ROOM
54 TEA ROOM & LIBRARY
55 PUBLIC AREA

0 5 10M

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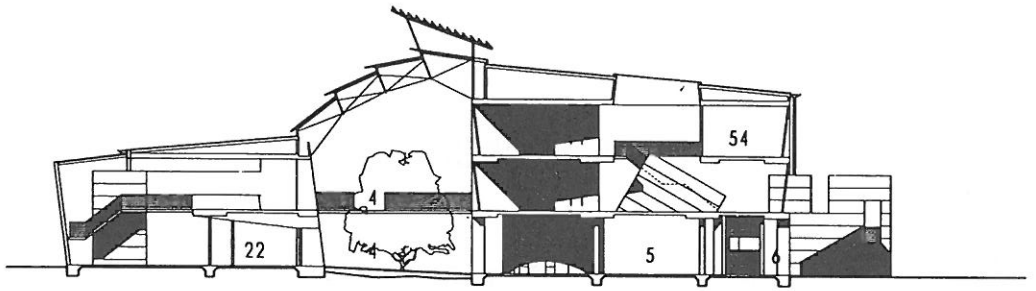
# CROSS SECTION A

AUGUST 1996




1 ACCESS BRIDGE
2 LOWER FORECOURT WITH WATER FEATURE
3 ATRIUM & EXHIBITION SPACE
4 BRIDGE
5 EXHIBITION & DISPLAY SPACE
6 LOADING DOCK
7 LIFT
8 PLANT ROOM
9 COMMUNICATION ROOM
10 STORE ROOM
11 LOBBY
12 TELLERS
13 LOANS AREA
14 OFFICE
15 INTERVIEW ROOM
16 FILING
17 EQUIPMENT ROOM
18 W/C
19 STAFF ROOM
20 SUBSTATION
21 MAIN SWITCH ROOM
22 SENIOR LABORATORY
23 DEMONSTRATION AREA
24 JUNIOR LABORATORY
25 REFUSE STORE
26 RECEPTION DESK
27 SHOP
28 CONFERENCE THEATRE
29 BIO BOX
30 CAFE DINING
31 SERVERY
32 KITCHEN
33 TERRACE
34 SEMINAR ROOM
35 MEETING ROOM
36 SICK BAY
37 LABORATORIES
38 CENTRAL SERVICES & EQUIPMENT AREA
39 TISSUE CULTURE GROWTH ROOM 1
40 TISSUE CULTURE GROWTH ROOM 2
41 LAMINAR FLOW CABINET LABORATORY
42 STUDY
43 DELIVERY ROOM
44 SOLVENT STORE
45 COMPUTER ROOM
46 COOL ROOM
47 RADIO CHEMICAL LABORATORY
48 PHOTOGRAPHIC PROCESSING ROOMS
49 WASH ROOM
50 INSTRUMENT ROOM
51 CULTURE ROOM
52 PHOSPHO / IMAGING LAB
53 SEQUENCING ROOM
54 TEA ROOM & LIBRARY
55 PUBLIC AREA

0 5 10M

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# LONGITUDINAL SECTION B

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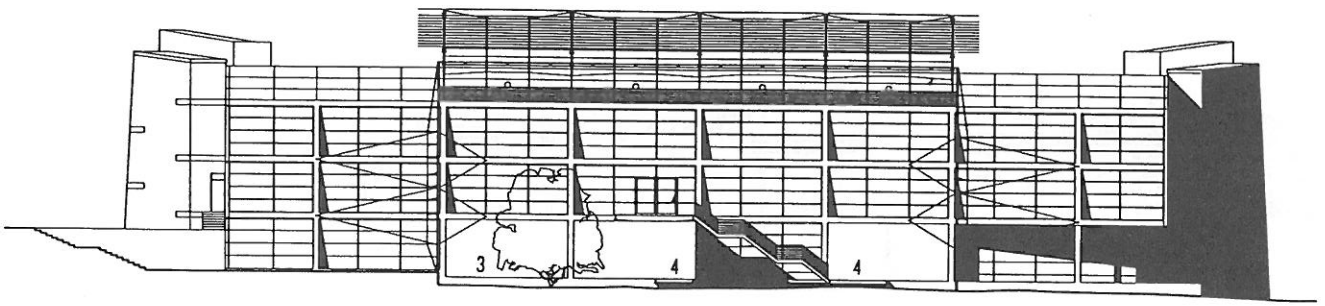


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54 TEA ROOM & LIBRARY
55 PUBLIC AREA

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# LONGITUDINAL SECTION C

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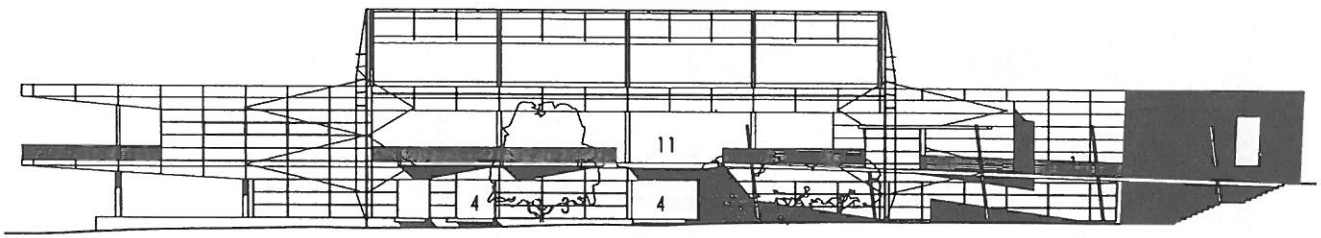


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54 TEA ROOM & LIBRARY
55 PUBLIC AREA

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# 10 NORTH ELEVATION

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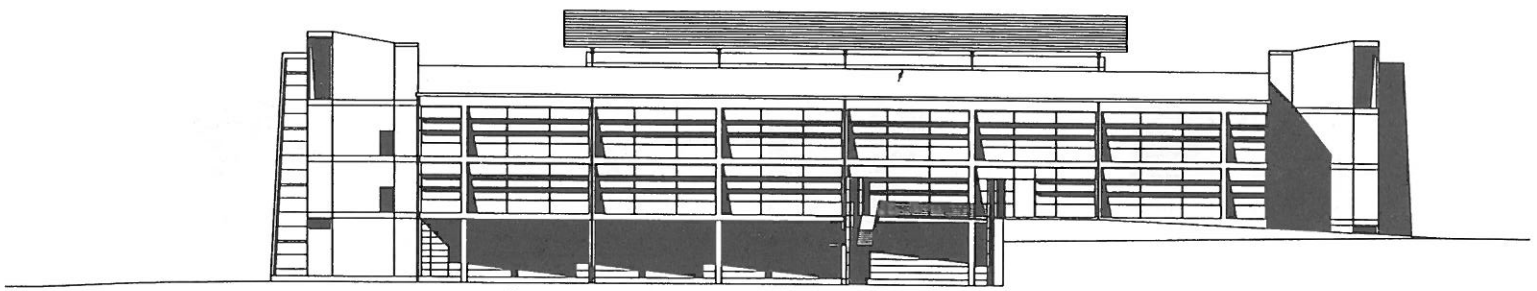

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# SOUTH ELEVATION

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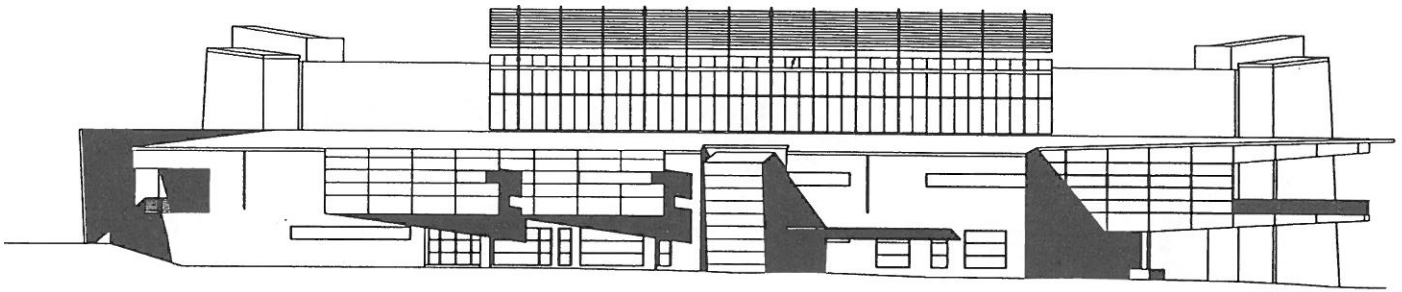

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# WEST ELEVATION

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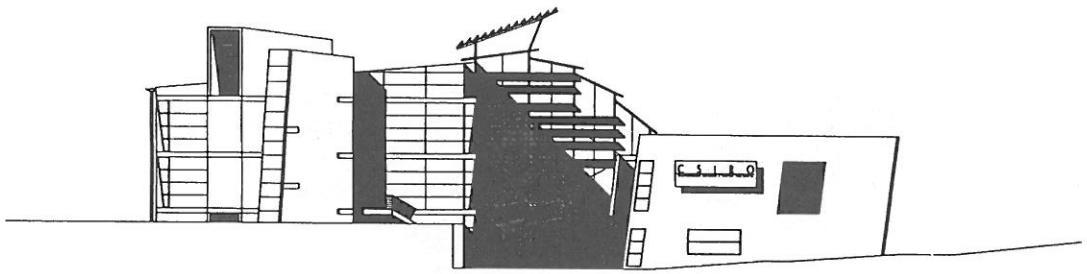


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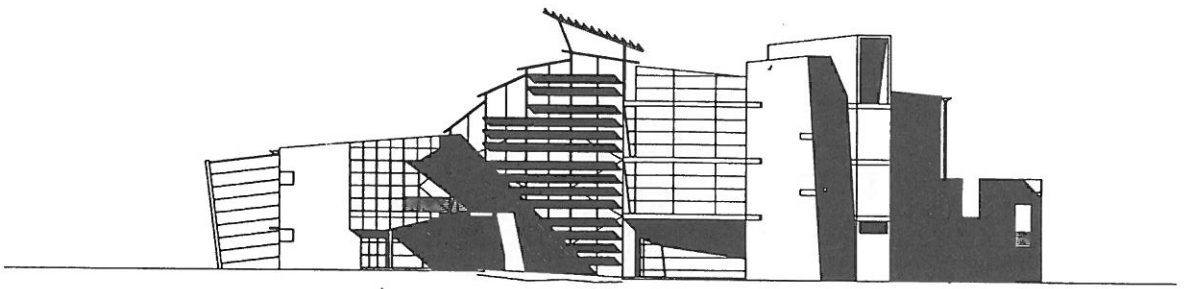
# EAST ELEVATION

AUGUST 1996



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# 14 VIEW - BUILDING ENTRY

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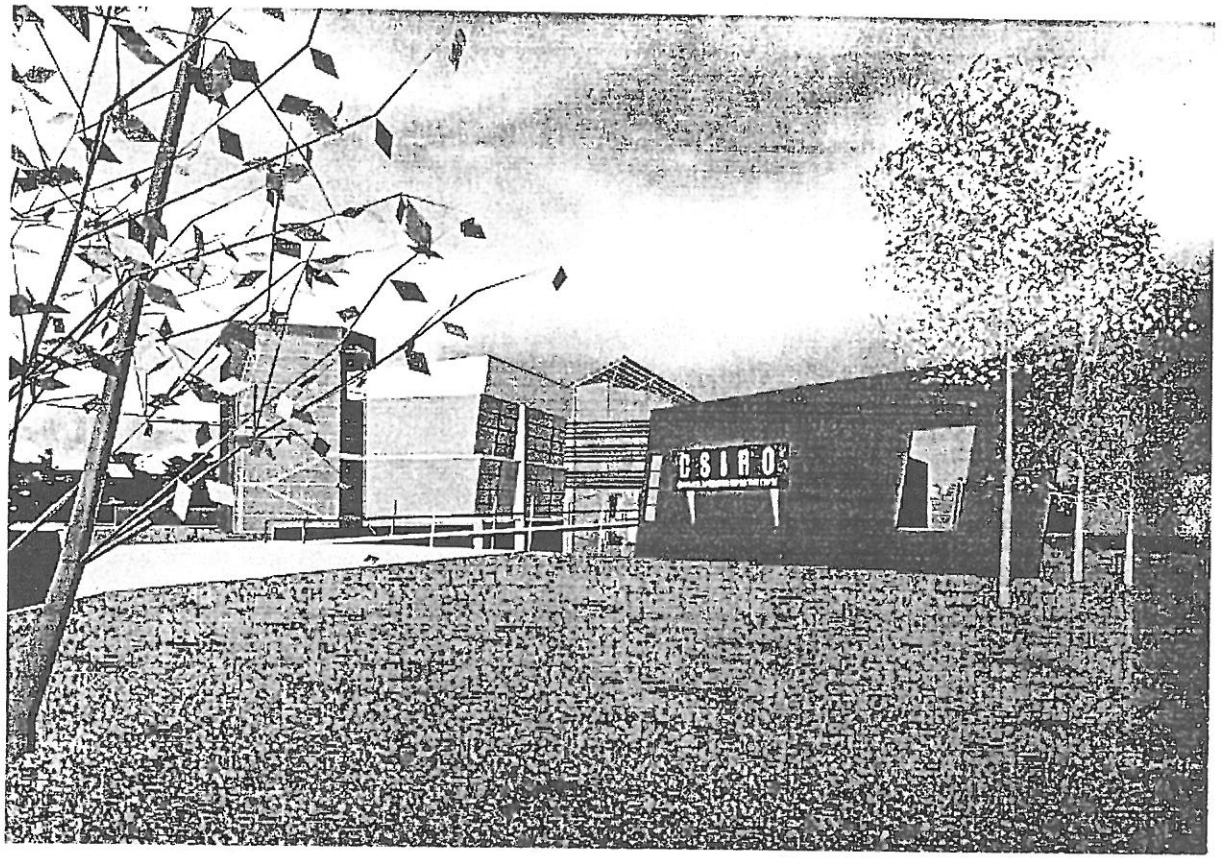


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# VIEW - INTERNAL ATRIUM

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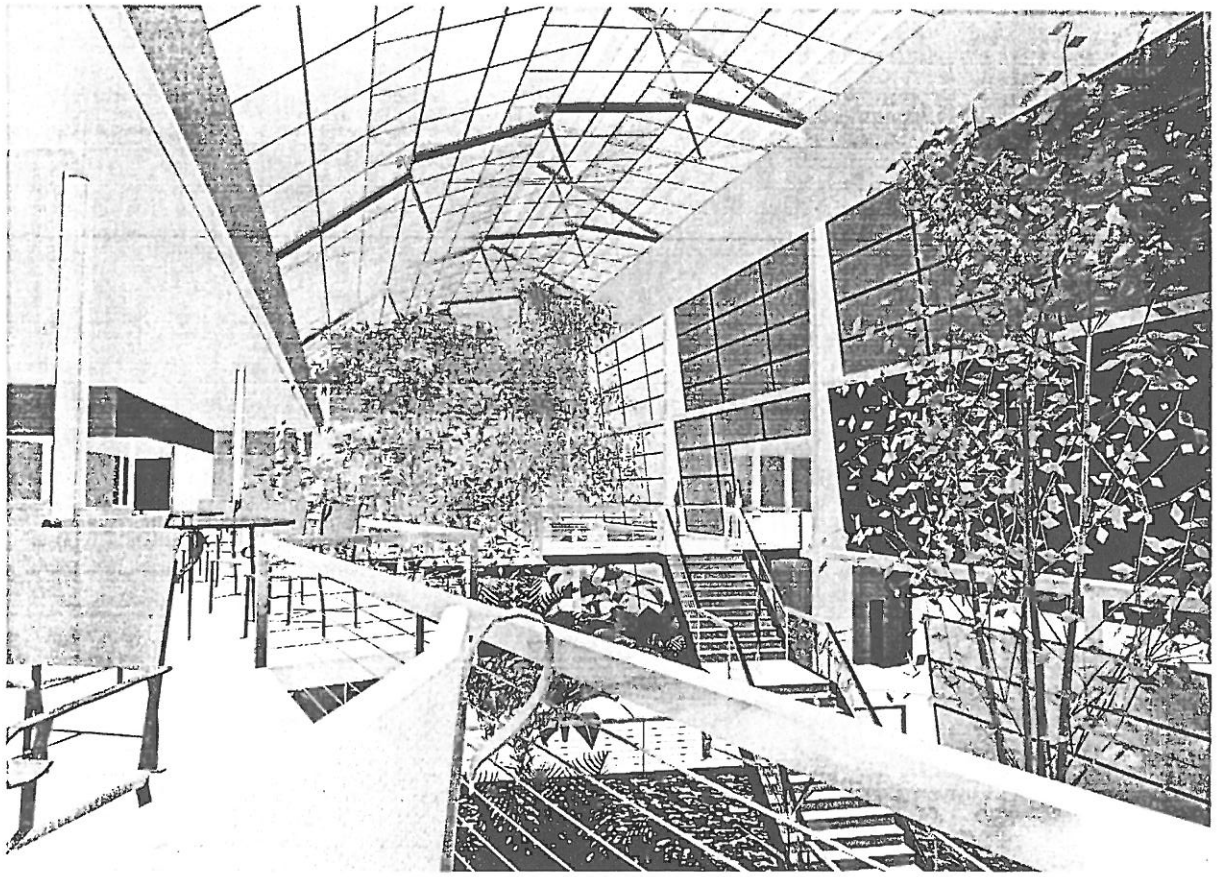

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