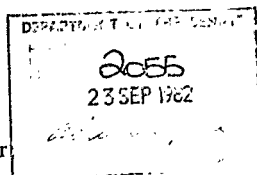




Parliamentary Standing Committee on Public Works

REPORT

relating to the proposal for



PHYSICS DIVISION BUILDING, MATERIALS RESEARCH LABORATORIES

at

Maribyrnong,
Victoria

(Twelfth Report of 1982)

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

1982

1982

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA
PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

REPORT

relating to the proposal for

PHYSICS DIVISION BUILDING, MATERIALS RESEARCH LABORATORIES

at

Maribyrnong,
Victoria

(Twelfth Report of 1982)

MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS
(Twenty-sixth Committee)

Melville Harold Bungey, Esq., M.P. (Chairman)
James Leslie McMahon, Esq., M.P. (Vice-Chairman) ⁵

Senate

House of Representatives

Senator Dominic John Foreman ³
Senator Bernard Francis
Kilgariff
Senator John Raymond Martyr ⁴
Senator Jean Isabel Melzer ¹
Senator Harold William Young ²

David Bruce Cowan, Esq., M.P.
Benjamin Charles Humphreys, Esq., M.P.
Urquhart Edward Innes, Esq., M.P.
Murray Evan Sainsbury, Esq., M.P.

- 1 Retired 30 June 1981
2 Ceased to be member on election as President
of the Senate on 18 August 1981
3 Appointed 25 August 1981
4 Appointed 25 August 1981
5 Appointed Vice-Chairman 27 August 1981

PUBLIC WORKS COMMITTEE ACT 1969
ORDER UNDER SUB-SECTION 18(4)

I, SIR ZELMAN COWEN, the Governor-General of the Commonwealth of Australia, acting with the advice of the Federal Executive Council, in pursuance of Sub-Section 18(4) of the Public Works Committee Act 1969, hereby, by this Order, declare that the public work described in the schedule be referred to the Parliamentary Standing Committee on Public Works for consideration and report.

SCHEDULE

CONSTRUCTION OF PHYSICS DIVISION BUILDING, MATERIALS RESEARCH
LABORATORIES, MARIBYRNONG, VICTORIA

L.S.

Given under my Hand and the
Great Seal of Australia
on 25 June 1982

By His Excellency's Command,

ZELMAN COWAN
Governor-General.

RALPH J. HUNT
Minister of State for
Transport and Construction

WITNESSES

Biffin, Dr. M.E.C., Superintendent, Science
and Technology Programmes, Department
of Defence, Campbell Park Offices,
Canberra, Australian Capital Territory

Bynon, G.S., Esq., Acting Director, Accommodation
and Works (Central), Department of Defence,
Russell Offices, Canberra, Australian
Capital Territory

Cole, K.H., Esq., Associate Director (Projects),
Department of Transport and Construction,
239 Bourke Street, Melbourne, Victoria

Mathias, L.E.S., Esq., Acting Superintendent,
Physics Division, Materials Research
Laboratories, P.O. Box 50, Ascot Vale,
Victoria

Paice, B.R., Esq., Project Manager, Department
of Transport and Construction,
239 Bourke Street, Melbourne, Victoria

C O N T E N T S

	<u>Paragraph</u>
THE REFERENCE	1
THE COMMITTEE'S INVESTIGATION	2
BACKGROUND	
Materials Research Laboratories	5
Functions of Physics Division	6
Existing Facilities	7
Future Use of Buildings	8
THE NEED	9
Committee's Conclusion	13
THE PROPOSED WORKS	
The Proposal	14
Experimental Bays	16
Support Laboratories	17
Radiation Shielded Room	18
Support Facilities	19
Design Features	23
Safety	25
Expansion Capacity	26
Security Fence	27
Committee's Conclusion	28
THE SITE	29
Committee's Conclusion	33
ESTIMATED COST	34
Committee's Conclusion	35
PROGRAM	36
Committee's Conclusion	37
RECOMMENDATIONS AND CONCLUSIONS	38

APPENDIX A

	<u>Paragraph</u>
CONSTRUCTION	
Structure	1
External Finishes	4
Internal Finishes	5
Air Conditioning and Ventilation	6
Special Services	9
Radiation Shielding	12
Fire Protection	14
External Works and Services	16
Environmental Impact	27
Regulations	28
Liaison with Authorities	29

ILLUSTRATIONS

Location Plan	A
Site Plan	B
Ground Floor Plan	C
Perspective	D

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

PHYSICS DIVISION BUILDING FOR MATERIALS RESEARCH LABORATORIES AT MARIBYRNONG, VICTORIA

R E P O R T

On 25 June 1982, His Excellency the Governor-General in Council referred to the Parliamentary Standing Committee on Public Works for consideration and report to Parliament, the proposal for the construction of Physics Division Building, Materials Research Laboratories, Maribyrnong, Victoria.

The Committee has the honour to report as follows:

THE REFERENCE

1. The proposal referred to the Committee is for the construction of a new building to accommodate physics research activities at the Materials Research Laboratories (MRL), and in particular those activities related to high energy laser and associated electronics experiments. The new building will enable consolidation of these activities in a single location, and will replace existing sub-standard facilities. The proposal will require the demolition of six small buildings, generally dating from the 1930s, which are in poor condition and represent an uneconomical use of the MRL site. The estimated cost of the proposal is \$2.6 million at March 1982 prices.

THE COMMITTEE'S INVESTIGATION

2. The Committee received written submissions and drawings from the Department of Defence and the Department of Transport and Construction, and a Sectional Committee took evidence from their representatives at a public hearing in Melbourne on 12 August 1982.

3. On 11 August 1982, the Sectional Committee inspected two of the five buildings that are currently occupied and used for scientific experiments in high energy laser research and electronics activities by the Physics Division of the Materials Research Laboratories. The Committee also inspected the site for the proposed new building.

4. The Committee's evidence will be printed as Minutes of Evidence.

BACKGROUND

5. Materials Research Laboratories The Materials Research Laboratories provide research and development support to all branches of the Defence Force by establishing and maintaining scientific and technical expertise in particular fields relevant to the supply and operation of Defence materiel. The Laboratories are organised broadly into four Divisions - Metallurgy, Physics, Physical Chemistry and Organic Chemistry.

6. Functions of Physics Division The Physics Division is engaged in continuing research concerned with lasers, electronics, and the interaction of laser radiation with materials, in support of Service sponsored and other tasks. This research includes:

- original design of apparatus incorporating large scale experimental lasers;
- experiments relating to particular military application of lasers;
- direct co-operation with overseas military research agencies by means of co-operative experiments; and
- theoretical analysis including computer usage.

7. Existing Facilities Experiments and other activities of the Physics Division are currently being carried out in five separate buildings at the Materials Research Laboratories. The new building will facilitate relocation from three of these buildings, which are run down and/or totally unsuitable for the purposes for which they are presently used. Details of these buildings are as follows:

- a) Building 510 This single-storey timber building was constructed as a temporary canteen during World War II. Although in poor condition, it is now used for laser related research. It has proved to be totally inadequate for this type of research as dust sealing is inadequate and no temperature control exists. The timber floor cannot support the heavy loads imposed by research equipment. The floor is also impregnated with kerosene due to leakage when used in large quantities in early experiments. Also laser experiments constitute a potential fire hazard in this wooden structure.
- b) Building 682 The top floor of this two-storey brick and concrete structure accommodates two large carbon-dioxide lasers which form the basis of the main facilities for laser experiments at MRL. However, the load carrying capacity of the floor is insufficient to firmly support heavy research equipment, and the passage of nearby tramway vehicles, activities in the workshop below, and ballistics experiments conducted by Metallurgy Division on the ground floor, all cause the upper floor to vibrate. Consequently, this building is totally unsuitable for high precision experiments where equipment has to be carefully aligned.

- c) Building 1060 This small 85m² brick and concrete building, located on the Ordnance Factory property adjacent to MRL, was originally built as an explosives store. Pending completion of the new building, it will house a new experimental rig, currently under construction, and which will be used for some potentially hazardous laser experiments. Building 1060 is outside the MRL secure area, and is separated from MRL by a very busy road.

8. Future Use of Buildings Building 510 will remain vacant and will eventually be demolished to make way for new buildings in accordance with the MRL Master Plan. The top floor of Building 682 will be taken over by Metallurgy Division who currently occupy the ground floor. Building 1060 will be returned to the Ordnance Factory for activities associated with general light explosives, for which it was purpose designed.

THE NEED

9. The existing accommodation for high energy laser research and electronics activities at MRL is, in most cases, substandard and unsuitable for the experiments being conducted within it. The buildings are also widely dispersed. The new Physics Building will supplement existing facilities and replace those that are unsatisfactory and dispersed.

10. Research to be carried out in the new building will be closely related to other areas of research being conducted by Physics Division in particular, and to a lesser extent, by other MRL Divisions. The new building should therefore be located on the MRL site at Maribyrnong.

11. The proposed new building will provide Physics Division with facilities conforming to modern laboratory standards, and it will increase the operational efficiency of the Division. It will also accommodate larger test rigs which are urgently required to fulfill Defence research co-operation program commitments with other countries.

12. Due to the increasing sensitivity and complexity of the research being conducted by Physics Division, it has become necessary for the work to be carried out under more stringent safeguards and security conditions than now exist at MRL. The proposed new building will therefore facilitate a higher degree of security than is currently possible.

13. Committee's Conclusion A new building to accommodate the high energy laser experiments and the electronics activities of the Physics Division is necessary.

THE PROPOSED WORKS

14. The Proposal This proposal has been developed in accordance with the MRL Master Plan. It is for construction of a new self-contained building to accommodate the high precision and classified, laser related experiments and electronics activities of the Physics Division.

15. The proposed building will contain:
- an experimental bay area;
 - support laboratories;
 - a radiation shielded room; and
 - a support facilities area containing
 - . a general engineering workshop,
 - . a photographic darkroom,
 - . a conference room,
 - . offices, and
 - . store rooms.

Construction details are set out in Appendix A.

16. Experimental Bays The most important elements of the new building are the experimental bays and laboratories. The building will have five experimental bays. These bays will mainly be used for setting up large scale test rigs which will often incorporate high energy lasers and complex electronics systems. These rigs will be used for experiments relating to the military application of lasers. The bays will have in-floor ducts for electrical power and instrument cabling, and this will assist in keeping the floor clear of cables. The bays will also be serviced by reticulation systems for gases, compressed air, and cooling water, and there will be a number of connection and extraction points for these services in each bay. Two electrical hoists will be installed on monorails for moving equipment in the experimental bays and workshop.

17. Support Laboratories The building will have five support laboratories. Whilst they may be used independently, they will usually be used for a wide range of activities in support of experiments being conducted in the experimental bays. These activities will include the preparation of support equipment, the development of components for test rigs, evaluation of the effects of laser radiation on materials, preliminary small scale experiments, and the development of monitoring systems.

18. Radiation Shielded Room The basement of the building will accommodate a radiation shielded room to contain high energy X-radiation that may be produced during the firing of some lasers. Radiation shielding will be achieved by concrete thicker than normally required for structural purposes, rather than by using special materials. The floor and walls will be concrete enclosed by compacted earth fill,

and a suspended slab, two metres thick, will cover the entire basement area. The radiation shielding requirements for the basement are being designed in consultation with the Australian Radiation Laboratory.

19. Support Facilities The engineering workshop to be provided, is essential for the construction, assembly, and modification of experimental test rigs.

20. Nearly all experiments performed involve photography - generally high speed photography. A photographic darkroom is therefore being provided on site to enable rapid processing of film. It will also be used for printed circuit-board work in the electronics field. The small amount of chemical waste that will be produced in the darkroom will be treated in a neutralising tank with a trap system using alkaline-acid retention.

21. At present there are no conference facilities at MRL where high security matters can be discussed in a secure fashion. A new conference room has therefore been incorporated in the proposed building. This new conference room has been designed with proper security in mind so that matters can be freely discussed without danger of breach of security.

22. The building provides general support facilities such as:

- a plant room for compressors, heating and cooling plant, and a vacuum pump and tanks;
- a gas store for gas cylinders;
- a 2MW electrical sub-station;
- a switch room;
- horizontal and vertical hoists;
- various store rooms; and
- office accommodation for scientists and support personnel.

23. Design Features The high energy laser research of the Physics Division is unique within Australia. It was therefore not possible to design a standard class of laboratory, and this building was therefore uniquely designed to meet the functions required by the laser research group.

24. A key feature of the design is the flexible nature of the experimental bays. They are designed so that more than one bay can be opened up and larger test rigs can be accommodated to provide for experiments across a number of bays. The building will have greater usable space and will be functionally laid out to suit various experiments. This flexibility will not only provide for current and anticipated needs for scientific experiments and research, but will also enable adaptation for alternative scientific research in the future.

25. Safety The general laboratory practice at MRL conforms with codes set by the Occupational Safety and Health Policy Committee of the Department of Industry and Commerce. The two codes of most concern to the Physics Division are AS2211 for laser safety, and AS2243 for laboratory safety. These codes are stringently adhered to within experimental areas at MRL and this proposal conforms with the requirements of these codes.

26. Expansion Capacity Current planning allows for the possible future expansion of the building to the south, in an area between the canteen and "A" Road.

27. Security Fence The new building will be within the existing security perimeter of MRL. However, the security fence will be extended to allow for a new access road and hardstanding car parking. No extraordinary security measures will be required for the building.

28. Committee's Conclusion The design of the proposed new Physics Division building is satisfactory.

THE SITE

29. The Physics Division Building will be located at the Materials Research Laboratories, Maribyrnong, within the secure perimeter. The proposed siting is in accordance with the MRL Master Plan. The Master Planning concepts of MRL provide for a functional layout of the establishment.

30. The selected site will consolidate the Physics Division in a localised area. The new building will be located near Building 435, the main Physics Division building, and Building 229, the only other building which accommodates Physics Division activities. Other sites on the MRL establishment were considered. Some were rejected as they were remote and deficient in function, and would encroach on the functional area of other Divisions. Some of these sites were also unsuitable due to their close proximity to the storage of explosives.

31. The chosen site was the only site on the MRL local area that did not require large scale demolition. However six small buildings in poor condition and generally of 1930's vintage, will have to be demolished. Some of these buildings are used for storage, and others for small scale activities that can be relocated elsewhere. None of the buildings are worthy of preservation.

32. Six substantial trees, including four attractive eucalyptus citriodora, will have to be removed to make way for the new building. These trees will be replaced by the same type of tree in the proposed new landscaped area between the canteen and the new building.

33. Committee's Conclusion The site selected is suitable.

ESTIMATED COST

34. The limit of cost estimate for the project when referred to the Committee was \$2.6 million, at March 1982 prices. This estimate is made up as follows:

Building Works	\$2,300,000
External Works and Services	300,000
	<u>\$2,600,000</u>

35. Committee's Conclusion The estimated cost of the project is \$2.6 million at March 1982 prices.

PROGRAM

36. The proposed timing is for tenders to be called in March 1983. The building should be completed and occupied by late 1984.

37. Committee's Conclusion The Committee recommends the construction of the work in this reference.

RECOMMENDATIONS AND CONCLUSIONS

38. A summary of the recommendations and conclusions of the Committee is set out below. Alongside each is shown the paragraph of the report to which it refers.

Paragraph

- | | | |
|----|--|----|
| 1. | A NEW BUILDING TO ACCOMMODATE THE HIGH ENERGY LASER EXPERIMENTS AND ELECTRONICS ACTIVITIES OF THE PHYSICS DIVISION IS NECESSARY. | 13 |
| 2. | THE DESIGN OF THE PROPOSED NEW PHYSICS DIVISION BUILDING IS SATISFACTORY. | 28 |
| 3. | THE SITE SELECTED IS SUITABLE. | 33 |

Paragraph

- | | | |
|----|--|----|
| 4. | THE ESTIMATED COST OF THE PROJECT IS \$2.6 MILLION AT MARCH 1982 PRICES. | 35 |
| 5. | THE COMMITTEE RECOMMENDS THE CONSTRUCTION OF THE WORK IN THIS REFERENCE. | 37 |


(M.H. BUNGEY)
Chairman

Parliamentary Standing Committee on Public Works
Parliament House
CANBERRA ACT
16 September 1982

APPENDIX A

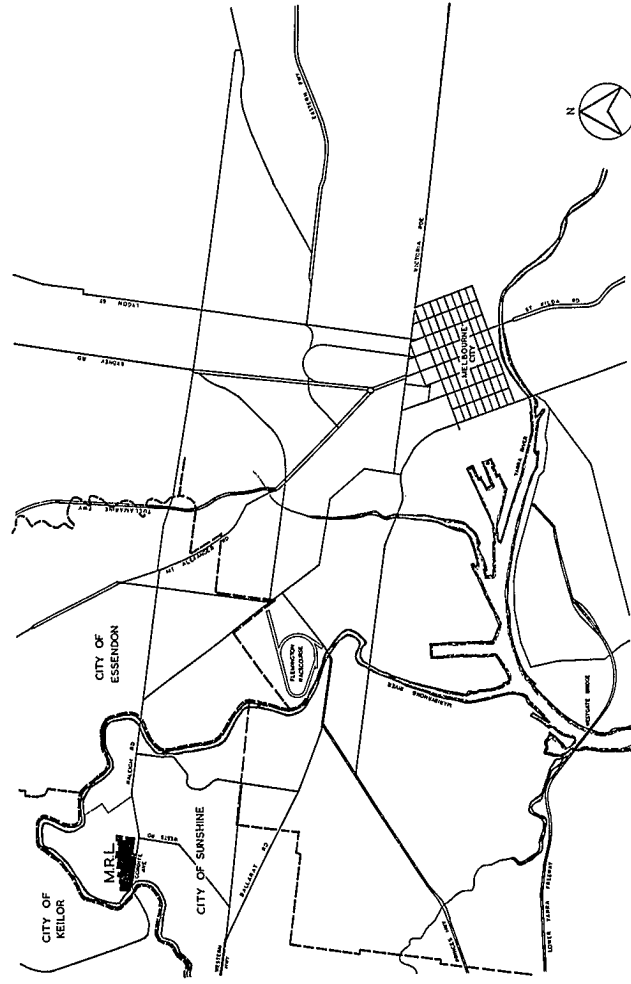
CONSTRUCTION

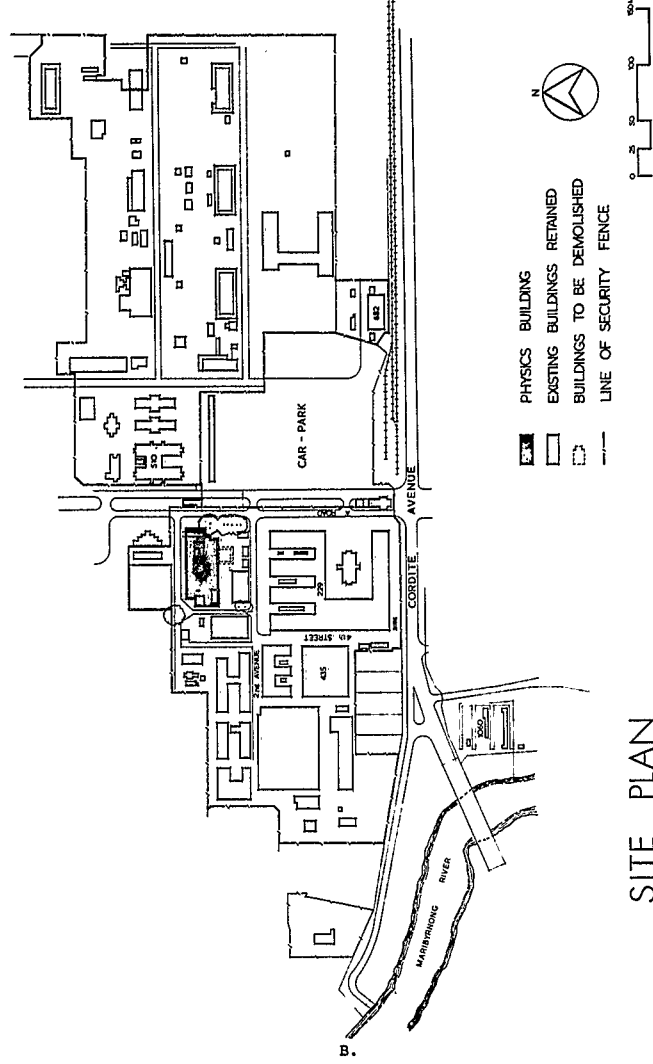
1. Structure The building will be a steel framed structure. Portal frames will span the experimental bays, and columns and beams will be utilised elsewhere.
2. The foundation soil type is silty clay, and the footings will be set at least one metre below the natural surface. The structure will be supported on reinforced concrete column pad footings, and strip footings for the external brick walls.
3. The basement will be constructed of reinforced concrete to contain radiation.
4. External Finishes Walls will be face brick infill panels and metal louvred vents, between painted steel columns. The roof will be metal decking.
5. Internal Finishes Internal walls will be brick, and partitions will be plasterboard lined. Windows will have anodised aluminium frames, and there will be suspended ceilings in offices.
6. Air Conditioning and Ventilation The areas to be air conditioned are:
 - offices and conference room,
 - experimental bays and laboratories, and
 - basement.
7. The building will be air conditioned for comfort in experimental areas, and to meet functional requirements and tolerance criteria in experimental areas.

8. Mechanical exhaust ventilation will be provided in toilet areas, store rooms, the dark room, workshop and basement. A combined system of mechanical and natural ventilation will be provided in the mechanical and electrical plant areas.
9. Special Services The experimental bays, laboratories and basement will be served with reticulated systems from the plant room for compressed air, vacuum service, recirculating cooling water, and bottled gases.
10. Two electric hoists will be installed on monorails for the movement of equipment in the experimental bays and workshop. A vertical hoist will be provided to service the basement.
11. Internal light and power will be provided in accordance with the relevant codes and standards. Medium voltage power will be provided from two transformers: one will provide general building and laboratory power supply, and the other is for a special laser power supply. An existing MRL generator will be located in the plant room to provide independent power for experimental measuring equipment. Emergency lighting will be provided throughout the building.
12. Radiation Shielding The radiation shielding requirements for the basement are being designed in consultation with the Australian Radiation Laboratory. The basement construction will consist of concrete floor and walls enclosed by compacted earth fill, with a concrete suspended slab, two metres thick, over the entire basement area.
13. The internal walls, access ways, ducts, conduits and all final detailing will be resolved in consultation with officers of the Australian Radiation Laboratory during the design development stage.

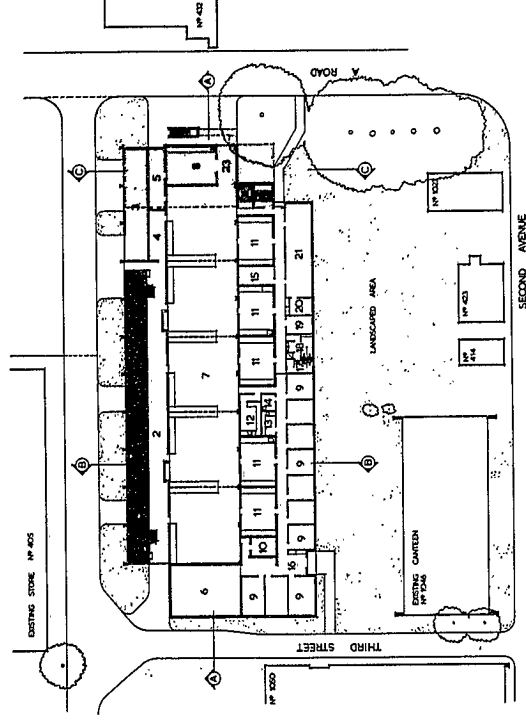
14. Fire Protection An automatic fire detection system of thermal and smoke detectors and manual break glass alarm points will be installed throughout the building and connected to the existing area alarm facilities.
15. The existing water supply system and hydrants can adequately meet fire fighting requirements. Portable fire extinguishers and fire hose reels will be installed throughout the building in accordance with the recommendations of the Commonwealth Fire Board.
16. External Works and Services Site Works: The site is currently traversed by building services for sewer, stormwater, water supply and gas reticulation. These will require minor diversions but main services trunking will not be disturbed.
17. Roads and Parking: Minor extension to the existing road system will provide adequate access to the building. No additional parking is required.
18. Water Supply: The existing reticulated water supply to MRL can adequately provide water for domestic and fire fighting purposes in the new facility.
19. Stormwater: Stormwater from the building and surrounding areas will be fed into the existing drainage system.
20. Sewerage System: Sewage will be discharged into the existing reticulated system and conveyed to a sewage treatment works adjacent to the Maribyrnong River. The treatment works has adequate capacity for the proposed building.
21. All photographic chemical wastes will be trapped and neutralised before entering the sewerage system.

22. Power Supply: Power will be connected via an underground cable from the 22 kV supply existing on the site.
23. External Lighting: External security lighting will be provided.
24. Natural Gas: Gas will be provided from the existing reticulated system to outlets in the experimental bays and laboratories.
25. Security: A security system will be provided in accordance with Department of Defence requirements.
26. Landscaping: The landscaped area will complement and extend the existing outdoor space provided for staff at MRL. This space, currently associated with the canteen, will be graded, grassed and planted with native trees and shrubs. As many as possible of the existing eucalypts, to the south-east of the proposed, building will be preserved.
27. Environmental Impact The Department of Defence has advised that an environmental impact statement is not required. The proposed building has no significant impact on the environment and all wastes can be satisfactorily discharged into the sewerage system.
28. Regulations The design of the building and services will comply with all relevant standards, codes, regulations and by-laws.
29. Liaison with Authorities The proposal has been developed in consultation with the State Electricity Commission of Victoria, Gas and Fuel Corporation of Victoria, Telecom Australia, Australian Radiation Laboratory, the City of Sunshine and the Metropolitan Fire Brigade.





SITE PLAN



LEGEND:

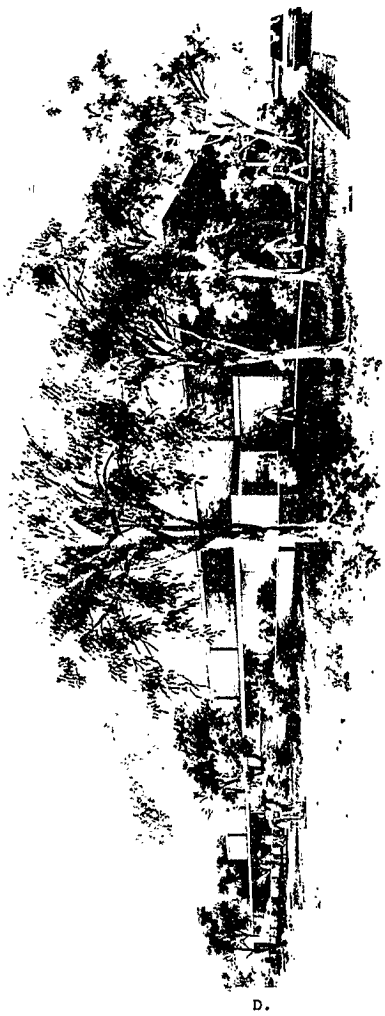
- 1 PLANT ROOM
- 2 GAS STORE
- 3 SUB-STATION
- 4 SWITCH ROOM
- 5 WORKSHOP STORE
- 6 CONFERENCE / DISPLAY
- 7 EXPERIMENTAL BAYS
- 8 WORKSHOP
- 9 OFFICES
- 10 SECURITY STORE
- 11 LABORATORIES
- 12 DARK-ROOM
- 13 TEA ROOM
- 14 CLEANER
- 15 LABORATORY STORE
- 16 ENTRY FOYER
- 17 FEMALE TOILET
- 18 MALE TOILET
- 19 FIRST-AID
- 20 OFFICE STORE
- 21 GENERAL OFFICE
- 22 HOIST
- 23 AIR-LOCK /LOADING BAY
- BASEMENT AREA UNDER
- PLANT MEZZANINE OVER



GROUND FLOOR PLAN



PERSPECTIVE



D.

