AUSTRALIA

Parliamentary Standing Committee on Public Works

REPORT

relating to the

CONSTRUCTION OF A SUBMARINE ESCAPE TRAINING FACILITY, HMAS STIRLING, GARDEN ISLAND, W.A.

(Sixth Report of 1985)

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA
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(Twenty-Eighth Committee)

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EXTRACT FROM THE
VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES
NO. 8 DATED 20 MARCH 1985

20 PUBLIC WORKS COMMITTEE - REFERENCE OF WORK - SUBMARINE ESCAPE TRAINING FACILITY, HMAS STIRLING, GARDEN ISLAND, W.A.: Mr West (Minister for Housing and Construction), 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: Construction of a submarine escape training facility, HMAS Stirling, Garden Island, W.A.

Mr West presented plans in connection with the proposed work.

Debate ensued.

Question - put and passed.

C O N T E N T S

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

CONSTRUCTION OF A SUBMARINE ESCAPE TRAINING FACILITY, HMAS STIRLING, GARDEN ISLAND, W.A.

REPORT

By resolution on 20 March 1985 the House of Representatives referred to the Parliamentary Standing Committee on Public Works for consideration and report the proposal for the construction of a submarine escape training facility, HMAS Stirling, Garden Island, W.A.

The Committee has the honour to report as follows:

THE REFERENCE

1. The work proposed under this reference comprises:

- a submarine escape training tank incorporating a submarine escape module;
- a shallow training module;
- support services for the submarine escape training tank and the shallow training module;
- an eight-level reinforced concrete building to house the tank, associated teaching areas and support services; and
- site works, building and engineering services.

2. The limit of cost estimate of the proposed work when referred to the Committee was $10.3 million at February 1985 prices.

THE COMMITTEE'S INVESTIGATION

3. The Committee received written submissions and plans from the Department of Defence (Defence) and the Department of Housing and Construction (DHC) and took evidence from their representatives at a public hearing held in Perth on 19 June 1985. On 18 June the Committee inspected HMAS Stirling, the site of the proposed submarine escape training facility (SETF), and was briefed by officers of the Royal Australian Navy on operational aspects of submarine escape. The Committee viewed a short video presentation on submarine escape training in the Royal Navy.

4. Written submissions were received from the Western Australian Government, Rockingham Shire Council and the National Headquarters and Western Australia Branch of the Returned Services League of Australia.

5. A list of witnesses who appeared at the public hearing and the organisations which they represented is at Appendix A.

6. The Committee's proceedings will be printed as Minutes of Evidence.

BACKGROUND

7. The RAN has a submarine force consisting of six Oberon-class submarines, the first of which entered service in 1967 and the last in 1977. The submarine force is based at HMAS Platypus in Sydney Harbour. Four submarines are in service while the remaining two undergo cyclical refits at any one time. Each submarine is manned by a crew of 56 sailors and seven officers.

8. Until recently all initial submarine training of RAN submariners was carried out at HMS Dolphin in the United Kingdom. From the beginning of 1985 the training of RAN submarine personnel at HMS Dolphin has been restricted to initial and requalification courses in submarine escape. All other facets of initial training will be carried out at the RAN submarine school at HMAS Platypus. This situation has arisen because the equipment originally fitted to British-designed and constructed RAN submarines is being replaced with a mix of equipment unique to Australia. For this reason initial submarine training in the UK has become less relevant to the RAN.

9. Requirement for Submarine Escape Training There are two reasons for the mandatory requirement that all submariners under the age of 35 undergo 'wet' initial and requalification training in submarine escape. The first is that community standards would not condone submarines putting to sea without the crew having at its disposal a means of surviving and escaping from a submarine disabled at a depth not exceeding the crushing depth of its pressure hull. The situation would be analogous to a fighter pilot without a parachute or a surface vessel putting to sea in hazardous conditions without lifejackets, lifeboats or life rafts.

10. The second reason derives from the fact that submarines are war vessels, which have been designed so that their escape equipment does not encroach on their military functions. The equipment and the method of escape must therefore be simple to use and to maintain.

11. For these reasons submariners need to be proficient in:

- operating escape equipment;

- the procedures to be followed in escaping from a disabled submarine;

- procedures designed to minimise the inherent risks associated with ascending to the surface from considerable depths.

12. Risks Periods when submarines are at greatest risk of being disabled are when:

- leaving dockyards;
- carrying newly fitted equipment and with newly formed crews;
- operating in shipping lanes;
- entering or leaving harbour;
- manoeuvring amidst navigational hazards;
- exercising with other units involving close-quarters situations.

13. A number of these activities occur in waters over a continental shelf where depths seldom exceed 200 metres. Defence advised that since 1945 almost all accidents involving Royal Navy submarines have occurred in waters of a continental shelf where the crushing depth of the pressure hull is not exceeded. In the event of a submarine being disabled and sinking to such depths the strength of bulkheads would permit survivors to remain alive in certain circumstances.

14. Two methods used by survivors to get out of a disabled submarine are 'escape' and 'rescue'. The escape method requires the survivors to leave the submarine without any external assistance. Rescue requires external assistance involving a deep submergence rescue vehicle locking on to the disabled submarine and transferring the survivors.

15. Escape is currently the only method available to RAN submariners. The Committee was advised that the new construction submarines will have a rescue capability but escape will nevertheless remain the fundamental survival method. Defence advised that escape is an effective and safe way for survivors to vacate a disabled submarine at a depth of no greater than 250 metres.

16. Two methods of escape available in the escape compartments of RAN submarines, located at forward and aft ends, are rush escape and tower escape.

17. Rush Escape This method is effective to a depth of approximately 45 metres and is used if the pressure hull is fractured and there is a need to vacate the submarine quickly. The following procedures are followed in rush escape:

- survivors put on special submarine escape immersion suits;
- the escape compartment is flooded, survivors obtaining air from special breathing units located in the escape compartment;
- when the air pressure in the escape compartment is equal to the outside water pressure, the upper escape hatch, which is set into the crown of the submarine pressure hull, opens automatically;
- a water/air interchange takes place;
- the first survivor takes air from a breathing unit and ducks under the trunk of the rush escape tower;

- positive buoyancy will enable the survivor to ascend to the surface at about 2 metres per second, exhaling the air in his lungs all the way to the surface.

18. By this method it is possible to clear the escape compartment quickly.

19. <u>Tower Escape</u> This method is effective to the maximum operating depth of a submarine and is slower than rush escape; the evacuation process can take up to four hours. Set into the crown of the escape compartment is a vertical tower measuring two metres high and 0.7 metre wide. The tower has an upper and lower pressure-tight hatch; the lower hatch opens into the escape compartment. The tower escape technique operates as follows:

- the survivor is dressed in a submarine escape immersion suit similar to that used for rush escape, with an additional feature, comprising a canvas hood, which covers the head;

- the survivor climbs into the tower via the lower hatch;

- the lower hatch is then shut and the survivor obtains breathing air from an air connection in the tower - this inflates the canvas hood and permits the survivor to breathe;

- the tower is flooded;

- when the air/water pressure inside the tower equals the outside water pressure, the upper hatch opens automatically;

- positive buoyancy will eject the survivor from the tower at an ascent rate of about 4 metres per second; the survivor is able to breathe normally all the way to the surface.

20. <u>Water Pressure</u> In order to open the escape hatch the air pressure inside the escape compartment (rush escape) or the escape tower (tower escape) must equal the outside water pressure. The chances of a survivor suffering from decompression illness (or the 'bends') following an ascent increase relative to the amount of pressure and the time spent under pressure. The greater the duration and the greater the depth the more likely the survivor will suffer from the bends following an ascent. In the case of divers, the problem of the bends is avoided by staging an ascent. Survivors cannot stage their ascent because of positive buoyancy and a lack of breathing equipment.

21. Bend threshold curves, or non-stop air diving times have been developed in order to calculate the maximum time that can be spent at various pressures before making a rapid ascent without a survivor subsequently suffering from the bends. For example, at 60 metres the maximum time is five minutes. This means that at 60 metres the survivor can be subjected to corresponding water/air pressure for no longer than five minutes before ascending. The Committee was advised that the maximum time that can be spent at 190 metres is 28 seconds. For these reasons escape towers are designed to be flooded rapidly.

22. A further hazard to survivors on leaving the escape compartment or the escape tower and ascending to the surface is the expansion of air inside the lungs. On pressure equalisation inside the escape compartment or single escape tower the survivor will be breathing air in excess of atmospheric pressure. Lungs do not expand like a balloon and have a capacity of about six litres at sea level. If a lung with this capacity was subjected

to water pressure at nine metres, the volume of air would decrease to about three litres, at 18 metres it would be 1.5 litres. Conversely, a survivor breathing pressurised air at 18 metres, will inflate the lungs with six litres of pressurised air, but this will be three times the density of atmospheric air pressure. On ascending to the surface the external pressure on the body will be progressively reduced and the air inside the lungs will expand. If a survivor does not exhale air during the ascent his lungs will explode.

23. The foregoing highlights the procedures in escaping from submarines and the hazards involved. In order for a survivor to survive an ascent he must be familiar with the equipment and procedures involved in escaping and the hazards associated with subjection to high air/water pressures.

24. Submarine Escape Training Facilities Submarine escape training is mandatory and for this reason and the complexities involved, special facilities have been constructed by most Navies with conventionally powered submarines in which to train personnel on the equipment, the procedures and to familiarise them with the hazards.

25. Submarine escape training facilities provide submariners with a simulated environment in which all facets of submarine escape are practised under controlled conditions. The simulated environment requires the provision of escape compartments representative of those fitted in submarines now in service and a water column of sufficient depth to familiarise and train submariners with water/air pressures that could be encountered and with safe escape techniques. Water columns vary in height; a column of 20 metres is considered suitable for submariners to be familiarised and trained in techniques required to safely complete an ascent.

THE NEED

26. The need to construct a modern and safe submarine escape training facility in Australia for the RAN stems from general policy pronouncements about Defence self-reliance and the high cost of undertaking escape training in the UK. In recent years there has been a continuing theme in ministerial pronouncements that Australia develop a more self-reliant defence capability. Construction of a SETF in Australia would be another tangible expression of this policy of self-reliance.

27. As mentioned in paragraph 8, escape training has been carried out at HMS Dolphin, the Royal Navy's submarine school, since the Oberon-class submarines were acquired by the RAN. Up until recently escape training formed part of the wider range of initial submarine training. Initial training comprised a six months course. The gradual development of the RAN submarine school at HMAS Platypus has now reached the stage where all initial training, with the exception of escape training, is carried out in Australia.

28. The Committee was advised that there will continue to be an annual requirement for 343 personnel to undergo escape training. Of these, 113 would need to undergo the five-day initial escape training; the balance of 230 would need to undergo the one-day requalifiation course. In aggregate terms the annual cost of continuing with overseas submarine escape training is almost $2.0 million; the major component of this expenditure comprising air fares.

29. In addition to the high recurrent costs, there are problems with the UK facility accommodating the RAN requirement. The UK facility cannot always accommodate the number of RAN personnel that require training at any particular time. Use by Australia of submarine escape training facilities in other countries would not meet the RAN requirements because of differences in equipment, procedures and techniques.

30. More reliable accessibility to a local Australian facility would enable the RAN to provide requalification training in submarine escape as frequently as is the case with submarine forces of other Navies. A local facility would reduce the interval between requalification from once every six to once every three years.

31. New Construction Submarine Project For the cost-benefit advantages of an Australian SETF to be realised fully, the facility would need to remain operational in its submarine escape training role for at least 35 years after commissioning. It is therefore prudent to question whether there are any commitments by the Government for the RAN to continue operating submarines beyond 1991/92 when it is planned to decommission the first of the Oberon-class submarines.

32. The Committee was advised that decisions on the new construction submarine project have now advanced to the project definition stage. It is planned to construct six new-generation conventionally powered submarines to replace the existing fleet. Contracts for a project definition study of two submarine designs and two suppliers of combat systems are to be awarded by the end of July or the beginning of August 1985. These studies will take 15 to 18 months to complete for evaluation by 1986/87 with the objective of submitting a recommendation to the Government during the first half of 1987. If the Government makes a decision on the construction of new submarines in late 1987 or early 1988, the first of the new submarines could be commissioned in late 1991 or early 1992. This would coincide with the decommissioning of the first Oberon-class submarine. It is planned to replace the balance over the following five years.

33. Defence envisage that the new submarines will have smaller crews. The concept of multiple crews was being examined in order to exploit the greater availability of the new submarines.

The Committee believes the required annual throughput of escape trainees could therefore remain unchanged with the introduction of the new submarines.

34. Based on the above outline it is clear that at present defence planning is based on the premise that submarines will continue to play a vital role in protecting Australia's maritime interests in the longer term. The project definition study is as yet the only indication of a long term commitment to submarines remaining in service.

35. Utilisation Utilisation of an Australian SETF would not be restricted to submarine escape training. It is clear that the need for the facility is based solely on submarine escape training. By limiting its use to this function, the relatively small numbers of submariners requiring training could result in the facility being under-utilised. Defence advised that the facility would be available for training divers of the RAN and other services. It would offer improved safety in diver training and will enable training in techniques which are currently not taught.

36. Defence advised that utilisation of an Australian SETF would be as follows:

	%
Submarine escape training	28
Diver training	65
Maintenance of facility	7

37. In addition, an Australian facility could also be available to train submariners of other allied Navies on a user pays basis or as part of defence co-operation. Civilians such as police divers could also use the facility. The RAN training requirement would, however, have priority over the training requirements of other organisations.

38. <u>Committee's Conclusion</u> There would be operational advantages and savings in recurrent expenditure by constructing a submarine escape training facility in Australia in which to train RAN submariners. An Australian facility would also provide improved conditions for training divers of the RAN and other services.

LOCATION

39. Defence advised that a number of criteria were used to assess the most suitable location for a submarine escape training facility in Australia. The location should be:

- in an existing naval facility which will continue in service in the foreseeable future;
- adjacent to other submarine operational or training facilities;
- readily accessible by submarines, by land and by RAAF routine flights;
- close to a sophisticated recompression chamber; and
- where the height of the tower housing the water column would cause minimal visual impact.

40. The RAN undertook an assessment of five locations in and around Sydney and Perth which met some or all of the site selection criteria. The assessment is outlined below.

41. <u>HMAS Waterhen, Sydney</u> It is planned to modernise this establishment, which has limited space. A submarine escape training facility at this location would have a significant visual impact on the Sydney Harbour foreshores.

42. <u>HMAS Platypus, Sydney</u> The Oberon-class submarines are based at this establishment in Sydney Harbour which also has been developed over a number of years as the RAN submarine school. The first training elements came into service in 1975 and full-scale training commenced in 1980. For these reasons HMAS Platypus would be the ideal location for submarine escape training. However, bearing in mind the extreme height and lateral dimensions of a SETF, the investigation revealed a lack of available space for this development. A further deficiency noted was that the SETF would be visually intrusive against the shoreline of Sydney Harbour. A final factor casting doubt on this location was the long term future of the submarine school remaining at HMAS Platypus.

43. Defence advised that a decision on the location at which to train crews for the new submarines is linked to the project definition study previously mentioned. The recommendation to the Government at the conclusion of the project definition study will contain an outline of a training plan. There will be a dual training transition period during which new personnel for both types of vessel will require concurrent training. There is no space for expanding the Oberon-class training facilities at HMAS Platypus. Alternative sites at which to construct training facilities for the new submarines are therefore being examined.

44. <u>HMAS Penguin, Sydney</u> This location has been under consideration for a SETF since 1967. The location is operationally and technically sound, but is adjacent to, and includes part of, the Balmoral Beach Conservation area which is listed on the Register of the National Estate. A large facility located adjacent to, or within its precincts, would be incompatible with overriding heritage considerations.

45. Jervis Bay This location, adjacent to HMAS Creswell, is remote from other submarine training establishments and support areas. Facilities for staff and support services, including accommodation and a sophisticated recompression chamber, are lacking and would need to be provided at considerable cost.

46. HMAS Stirling (Garden Island) W.A. Defence stated that this location meets the selection criteria more readily than the other locations examined for the following reasons:

- the existence at HMAS Stirling of a recently commissioned sophisticated hyperbaric recompression chamber. In the event of a trainee sustaining a serious cerebral gas embolism following an ascent at the SETF, the close proximity of a hyperbaric complex could prevent the incident becoming fatal.

- the existence of submarine operational facilities at HMAS Stirling;

- the availability of adequate and visually non-intrusive space at HMAS Stirling;

- the possibility of submarines being based at HMAS Stirling in the future;

- the availability of accommodation, messing, medical facilities and technical support;

- proximity to a secondary user of the facility, the Special Air Service Regiment.

47. Support Infrastructure at HMAS Stirling HMAS Stirling is located on Garden Island, south of the City of Perth. The island, which is linked to the mainland by a causeway, is about nine kilometres from north to south and about 1.5 kilometres at its widest point. It has an area of 1260 hectares of which the RAN uses about one-third. (See Appendix B, Illustration B-1: Locality Plan.)

48. Facilities comprising HMAS Stirling were the subject of inquiry by the Committee in 1972 [Seventh Report of 1972, Parliamentary Paper No. 37/1972]. The Naval Support Facility was commissioned in 1978 and in present day terms the value of investment by the Commonwealth is about $150 million. (A copy of the Master Plan of HMAS Stirling is at Appendix B, Illustration B-2.) The facility was designed to support four destroyers and two submarines at any one time and is manned by uniformed personnel.

49. Current manning comprises about 260 personnel attached to HMAS Stirling and about 90 personnel on the staff of Naval Officer Commanding, Western Australia, the clearance diving team and other units. Ships based at HMAS Stirling have total complements of about 426 personnel. There are also 41 civilians working on the island.

50. Accommodation for 17 officers, 42 senior sailors and 216 junior sailors is available. Current occupancy rates are about 50 per cent but with home porting of additional vessels there will be a need eventually to expand live-in accommodation.

51. There are three main workshop complexes, namely, engineering, electrical and shipwright. The workshops have capacity to undertake maintenance and repair work.

52. The slipway, which is capable of accepting vessels up to 300 tonnes, can handle Fremantle-class and Attack-class patrol boats.

53. Kitchen facilities, in three galleys, can cater for 650 personnel. At present 340 meals are provided per day.

54. There is no shortage of building land although the sensitivity and uniqueness of the island's environment would need to continue to be recognised.

55. In summary, an examination of possible locations for a SETF was carried out. Sites in Sydney Harbour lacked space or were recognised as unacceptable on environmental grounds. Jervis Bay lacks the necessary support infrastructure and is distant from a sophisticated recompression chamber. HMAS Stirling has the necessary support infrastructure, has good road and air communications and sufficient developable land for a SETF.

56. Separation Faced with this choice, the Committee nevertheless questioned the desirability of having the submarine school and the SETF, which forms a part of submarine training so widely separated. Defence admitted that there would be advantages in having the SETF collocated with the submarine school. A cost study revealed that, subject to a number of pre-conditions, the financial equation would favour a SETF not being located in the west. The financial penalties were, however, somewhat marginal. The costs of transporting personnel requiring requalification training would be reduced by submarines based on the east-coast visiting HMAS Stirling or by deploying a submarine there. If advantage is taken of RAAF flights, which it is understood will run on a weekly basis within the time-frame in which a new SETF could be commissioned at HMAS Stirling, travel costs could be reduced for initial trainees. A further factor which tends to add considerable weight to the argument is that HMAS Stirling is being considered as the possible location for the new submarine school.

57. Committee's Conclusion The location of a submarine escape training facility at HMAS Stirling offers advantages over the other possible locations which were examined.

THE PROPOSAL

58. The proposal is to construct a submarine escape training facility at HMAS Stirling.

59. Siting A study of three possible sites for the facility at HMAS Stirling was carried out. (The locations of the three sites are shown on the Master Plan, Appendix B, Illustration B-2.)

- Site X - immediately west of the sports oval, adjacent to the accommodation area;
- Site Y - in the buffer zone to the north of the operational/industrial facilities and east of the accommodation area; and
- Site Z - adjacent to the hyperbaric recompression chamber and facilities occupied by the Navy diving clearance team.

60. Of the three, Site X was considered the most suitable. The tower housing the water column, which would have a height of 32 metres, would be less visually intrusive than at the other two sites due to the close proximity of a 47 metre high hill to the west. Sub-surface conditions at Site X are superior to other sites examined and were described as quite good. Investigations revealed a 12 metre layer of sand overlaying two metres of silt on limestone. The other two sites would attract cost penalties due to inferior sub-surface conditions. The tower would be more visually intrusive at the other two sites.

61. The Facility The facility has been designed to train submariners in methods of escape from a disabled submarine by classroom instruction and drill in simulated conditions. A secondary function and requirement of the facility will be to

support training in special diving techniques. (A perspective, illustrating the external appearance of the facility is at Appendix B, Illustration B-3.)

62. The facility has been planned to provide a high degree of operational safety. As well it will be provided with equipment which is reliable in operation and can be readily maintained. Australian industry will be given the opportunity of participating in the project.

63. The facility will consist of three elements:

- the submarine escape training tank;

- specialised equipment such as a diving bell and work platform; and

- the building housing the tank, the specialised equipment, classrooms and support areas.

64. <u>Submarine Escape Training Tank</u> The submarine escape training tank will consist of a tank, 20 metres deep, and 5.5 metres in diameter containing heated fresh water. It will have a capacity of 475 cubic metres (about half the volume of an Olympic-sized swimming pool). The tank will be constructed from mild steel and protected with corrosion-resistant coatings.

65. At the base of the main water column will be a submarine escape module consisting of a single escape tower for practising tower escape, a rush escape hatch, for practising rush escape, and an annexe. Both the single escape tower and the rush escape hatch will be representative of those fitted in present and future Australian submarines.

66. At the third level of the main water column (nine metres from the surface), will be a diving lock capable of accommodating 14 divers wearing fully inflated life jackets. This diving lock will be used for familiarisation of trainees undertaking initial escape training.

67. Two instructors' blisters will be located at the first and fourth levels to provide breathing air for instructors present in the tank during training. Viewing ports will be provided as part of the blisters.

68. Adjacent to the main tank will be a shallow training module, whose hatch and controls will be representative of those fitted to Australian submarines. It will be used for practising tower escape as part of initial training. The entrance to the module will be from the fourth level.

69. Compressed air will be provided for breathing air, water level control in flooded compartments and pressurisation of recompression chambers. Breathing air will be provided from duplicated air compressors and will be treated to conform with accepted standards for diving air.

70. Fresh water will be continuously recycled through sand-bed type filters, chemical treatment will be automated and the water temperature will be maintained at 32 degrees celsius by gas-fired boilers. At the public hearing DHC advised it is planned to use solar hot water heaters to boost the gas-fired heating system.

71. Measures to achieve rapid flooding and draining will be provided for the submarine escape compartment, single escape tower, diving lock and the shallow training module.

72. A control console will be located at the sixth level, at the top of the tank. The console will have master controls for the diving bell and work platform single escape tower and rush

escape hatch. Closed circuit television monitors will be provided for surveillance of all activities. The control console will also be provided with an underwater voice communication system. A loud speaker will be located in the bottom of the tank to enable instructors at the control console to communicate with instructors and trainees in the tank. Two-way communication will be possible from the instructors' blisters and the diving bell. Other controls to be provided include casualty and equipment failure alarms, telephone, public address system and clocks and stop watches. Equipment in the control console will be sealed and kept under pressure to prevent humidity interfering with electrical components. All other equipment will be designed to inhibit the effects of moisture.

73. <u>Specialised Equipment</u> A number of items of specialised equipment will be installed to assist instructors and to provide medical back-up in the event of a mishap during training.

74. The diving bell, comprising a platform covered by a dome containing breathing air, will be provided so that up to three instructors can be raised and lowered in the tank. A work platform will be provided to enable maintenance to be carried out on the inside of the tank and also to create a false bottom.

75. A six man recompression chamber will be located at both the ground and sixth levels. The Committee questioned the need for two chambers. Defence advised that the chamber at the ground level is necessary to familiarise trainees with the experience of being subjected to high air pressures. Additionally, should a trainee being pressurised in the single escape tower, incur any medical problems before pressure equilisation is reached, the safest means of returning the trainee to atmospheric pressure would be to depressurise the tower and quickly transfer him to the recompression chamber.

76. The Committee was advised that the second recompression chamber, at the sixth level, is required to cater for any incident, however minor, which may result from an ascent. If the control officer has any doubt about a trainee's well-being following an ascent, the trainee is transferred to the recompression chamber as a precaution. The six-man capacity requirement was dictated by the requirement for a doctor and an attendant to be present in the chamber during recompression and the ready market availability of chambers with a six-man capacity. Defence emphasised that the decision to provide two recompression chambers was based on safety and on overseas experience.

77. A drawing of the training tank showing the inter-relationship of the various systems is at Appendix B, Illustralion B-4. A section of the building housing the tank, and support facilities is at Illustration B-5.

78. <u>Building</u> Plans and elevations of the building are at Appendix B, Illustration B-6 to B-9 inclusive. The following functional areas will be provided in the building whose architectural form and detail will complement the existing buildings at HMAS Stirling:

- wet training areas;

- classrooms - one to accommodate 30 trainees and two for 15 trainees each;

- medical consulting room;

- light mechanical workshop;

- offices, equipment storage, change rooms and amenities rooms.

79. The single storey section of the building will be steel framed with concrete and glass wall elements. The high rise section of the building, containing the tank, will be constructed of reinforced concrete. The Committee questioned the use of concrete in favour of more lightweight and equally durable material. DHC advised that concrete is more durable in a marine environment and achieves more desirable insulation. Both the building and the tank will be supported on a reinforced concrete raft. A natural concrete finish will be retained for external walls. Special paints will be used to inhibit condensation in areas subjected to the humid atmosphere associated with the water column.

80. Wet training areas will have non-slip vinyl floors. Classrooms, administrative and recreation areas will be isolated from the humid atmosphere and will have carpeted floors with acoustic tile ceilings and plaster rendered masonry walls. Ducted air conditioning will be provided to all administrative, amenities and training areas. Wet training areas will be dehumidified.

81. An automatic starting diesel generator will supply power to essential equipment and systems in the event of a power failure. The existing high voltage electricity supply will be extended to the site and a new substation will be provided for the facility.

82. A goods/passenger lift will service all floors except the upper plant room.

83. An automatic fire detection and alarm system will be installed and fire hose reels and fire extinguishers will be provided.

84. A heavy duty access road to service the facility from the existing road network will be constructed. Car parking will be provided for 30 cars.

85. Staffing and Overseas Training The facility will have an overall permanent staff of 20 personnel. It will be necessary for the first incumbents to be trained in the UK and the Federal Republic of Germany. The latter has a facility representative of what is proposed under this reference which can be used as a model for super-imposing drills and procedures practised in the Royal Navy.

86. The facility will need to be manned by one member of the staff on a continual basis to attend to the needs of any trainee suffering from any disorder following water ascent training.

87. Review and Certification The design of the facility was developed after an examination of overseas establishments by officials from DHC and Defence. Countries with operational facilities visited included the UK, United States, Norway and the Federal Republic of Germany.

88. DHC will employ an independent certification authority to ensure that the facility will meet all safety requirements and international standards. The certification authority will undertake a design review of specific requirements of the detailed documentation to be provided to suppliers of the equipment and to contractors. This review process is considered necessary due to the prescribed safety requirements and the uniqueness of the facility.

89. Committee's Conclusion The siting and design of the submarine escape training facility are satisfactory. They reflect environmental consciousness and an awareness of the need for high levels of operational safety and reliability.

ENVIRONMENTAL CONSIDERATIONS

90. On 26 July 1983 the Garden Island Environmental Advisory Committee, whose membership consists of Commonwealth and State representatives, met to consider the location planned for the facility. That Committee agreed that the facility would have no significant impact if located at the proposed site.

91. A Notice of Intent on the proposal was provided to the then Department of Home Affairs and Environment in June 1984. The NOI canvassed the question of location (Sydney Harbour, Jervis Bay and HMAS Stirling) and siting within HMAS Stirling. The document stated that a land management plan had been prepared for Garden Island, W.A., in 1980. The management plan is to be reviewed in conjunction with the NOI. The Department of Home Affairs and Environment advised Defence in August 1984 that following an examination of the NOI and consultations with the Western Australian Department of Conservation and Environment, the preparation of an environmental impact statement would not be required to achieve the object of the Environment Protection (Impact of Proposals) Act 1974.

CONSULTATIONS

92. DHC advised that the following organisations were consulted in the development of the proposal:

- Vickers Shipbuilding and Engineering Ltd;
- Vickers Cockatoo Dockyard Pty Ltd;
- Drager Australia;
- Lloyd's Register of Shipping.

93. The Committee received written submissions from the Western Australian Government and Rockingham Shire Council. Both organisations are fully supportive of the proposal.

COSTS AND TIMETABLE

94. The limit of cost estimate for the proposal when referred to the Committee was $10.3 million at February 1985 prices.

95. Defence advised that the total project cost is estimated to be $13.62 million at February 1985 prices. The additional allowance of $3.32 million, not included in the limit of cost estimate, is for a commissioning and construction contingency, married quarters, special equipment, training and documentation.

96. The proposal has received the approval of the Minister for Finance for documentation to proceed concurrently with the Committee's consideration of the reference. The Minister for Finance also agreed that a contingency for commissioning and construction be provided. The amount of the contingency will be determined at the tender evaluation stage.

97. Defence advised that a maximum of 10 married quarters could be required to accommodate the staff of the facility. A decision on the number of houses required will be made at an appropriate time before the facility becomes operational. The number required will be influenced by the availability of Navy houses in the area. Each new house would cost about $45,000.

98. Special equipment to be provided, not included in the limit of cost estimate, includes medical hardware and equipment to support the light machine workshop.

99. DHC advised that construction time is expected to be 30 months.

100. Committee's Recommendation The Committee recommends construction of the work in this reference.

RECOMMENDATIONS AND CONCLUSIONS

101. The recommendations and conclusions of the Committee and the paragraph in the report to which each refers are set out below:

		Paragraph
1.	THERE WOULD BE OPERATIONAL ADVANTAGES AND SAVINGS IN RECURRENT EXPENDITURE BY CONSTRUCTING A SUBMARINE ESCAPE TRAINING FACILITY IN AUSTRALIA IN WHICH TO TRAIN RAN SUBMARINERS. AN AUSTRALIAN FACILITY WOULD ALSO PROVIDE IMPROVED CONDITIONS FOR TRAINING DIVERS OF THE RAN AND OTHER SERVICES.	38
2.	THE LOCATION OF A SUBMARINE ESCAPE TRAINING FACILITY AT HMAS STIRLING OFFERS ADVANTAGES OVER THE OTHER POSSIBLE LOCATIONS WHICH WERE EXAMINED.	57
3.	THE SITING AND DESIGN OF THE SUBMARINE ESCAPE TRAINING FACILITY ARE SATISFACTORY. THEY REFLECT ENVIRONMENTAL CONSCIOUSNESS AND AN AWARENESS OF THE NEED FOR HIGH LEVELS OF OPERATIONAL SAFETY AND RELIABILITY.	89
4.	THE LIMIT OF COST ESTIMATE FOR THE PROPOSAL WHEN REFERRED TO THE COMMITTEE WAS $10.3 MILLION AT FEBRUARY 1985 PRICES.	94

		Paragraph
5.	THE COMMITTEE RECOMMENDS CONSTRUCTION OF THE WORK IN THIS REFERENCE.	100

D.J. Foreman.

(D.J. FOREMAN)
Chairman

Parliamentary Standing Committee
on Public Works
Parliament House
CANBERRA

22 August 1985

APPENDIX A

LIST OF WITNESSES

Adams, Commodore H.J.P., Director-General of Facilities, Navy, Navy Office, Department of Defence, Canberra, Australian Capital Territory

Hand, N.K., Esq., Project Manager, Western Australian Region, Department of Housing and Construction, Perth, Western Australia

Jones, P.J., Esq., Design Project Leader, Western Australian Region, Department of Housing and Construction, Perth, Western Australia

Kinsella, R.J., Esq., Assistant Secretary, Financial Policy and Costing, Department of Defence, Canberra, Australian Capital Territory

Martin, G.S., Esq., Associate Director, Projects, Western Australian Region, Department of Housing and Construction, Perty, Western Australia

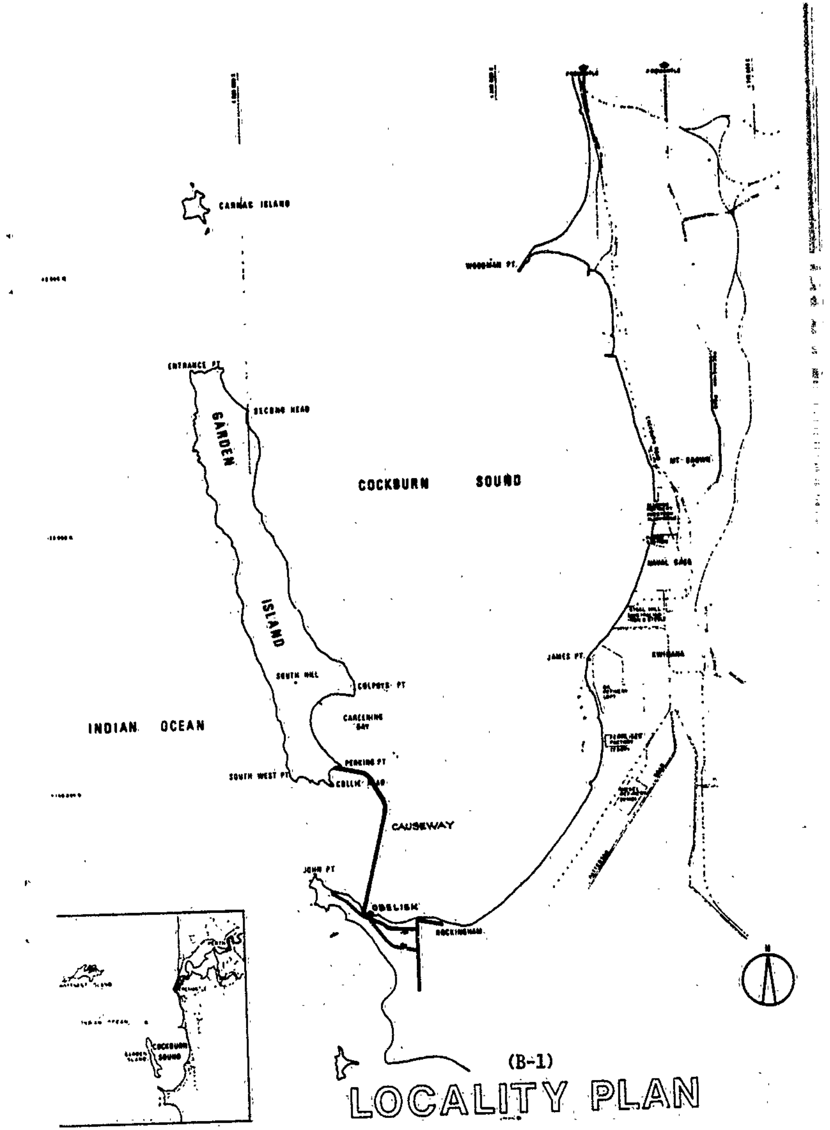
Roach, Captain T.A.A., Director, Submarine Policy, Navy Office, Department of Defence, Canberra, Australian Capital Territory

Robinson, Captain A.B., Commanding Officer, HMAS Stirling, P.O. Box 228, Rockingham, Western Australia

Russell, Lieutenant Commander D.R., Project Officer, Submarine Escape Training Facility, Navy Office, Department of Defence, Canberra, Australian Capital Territory

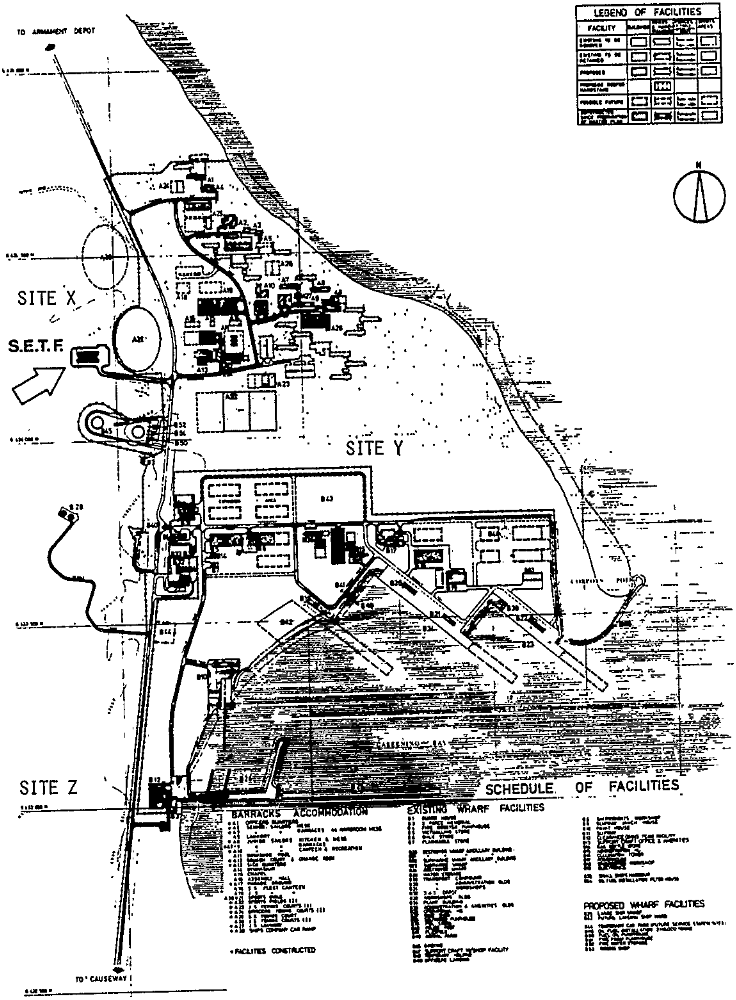
APPENDIX B

ILLUSTRATIONS



(B-1)

LOCALITY PLAN



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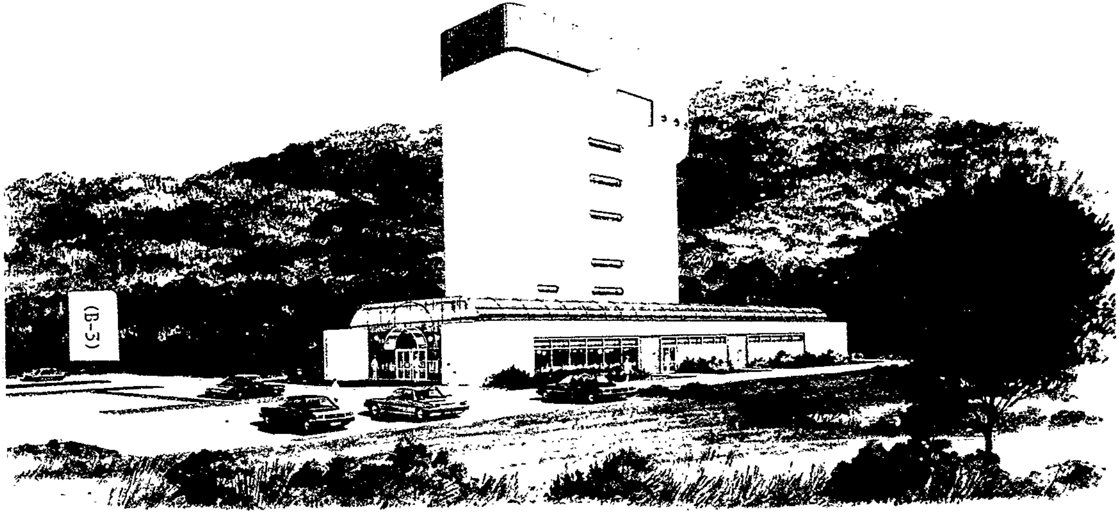
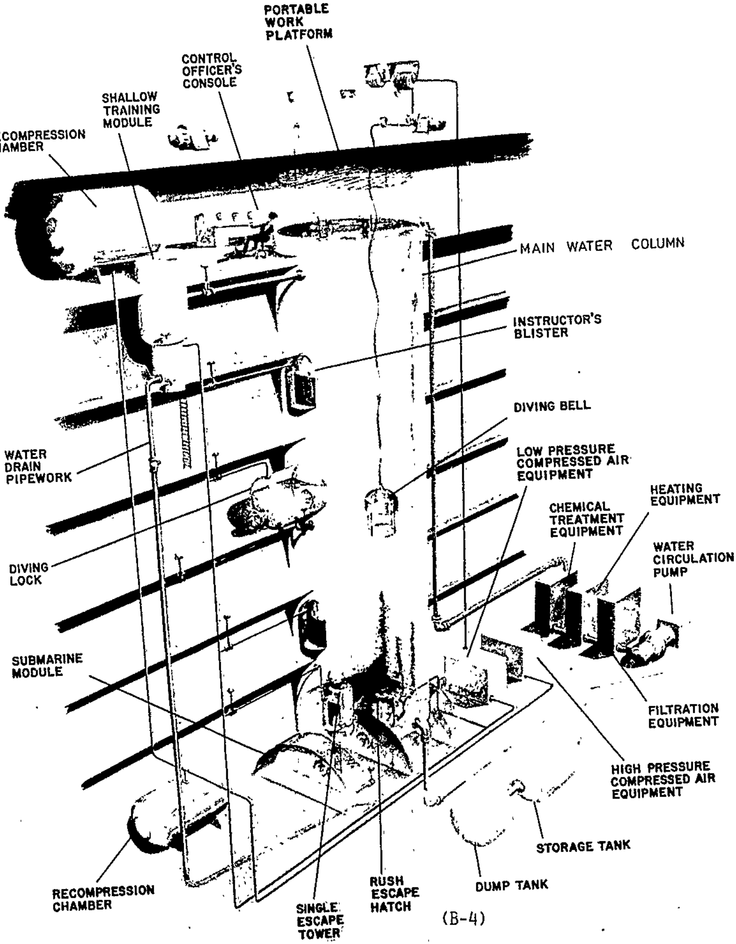
250 0 250 500

MASTER PLAN



PERSPECTIVE

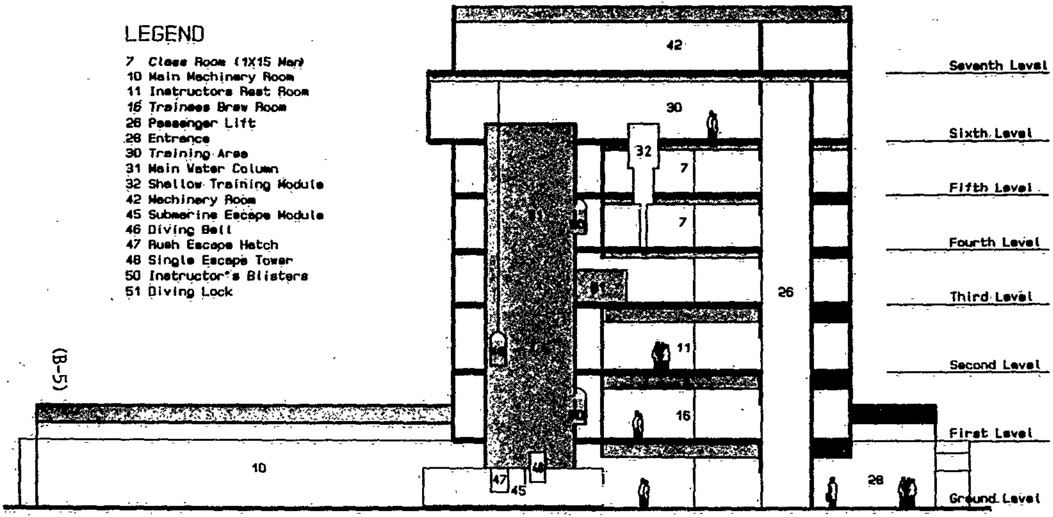


(B-4)

SYSTEMS CONCEPT

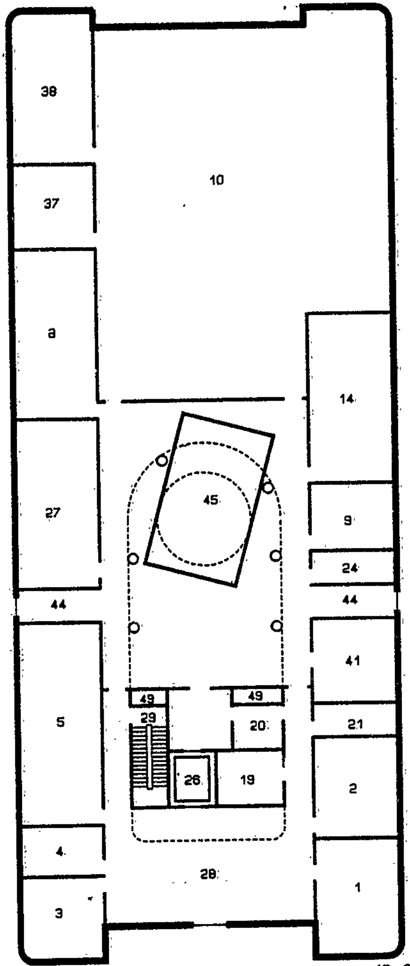
LEGEND

7 Class Room (1X15 Man)
10 Main Machinery Room
11 Instructors Rest Room
16 Trainees Brew Room
26 Passenger Lift
28 Entrance
30 Training Area
31 Main Water Column
32 Shallow Training Module
42 Machinery Room
45 Submarine Escape Module
46 Diving Bell
47 Rush Escape Hatch
48 Single Escape Tower
50 Instructor's Blisters
51 Diving Lock



(B-5)

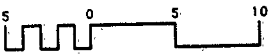
SECTION



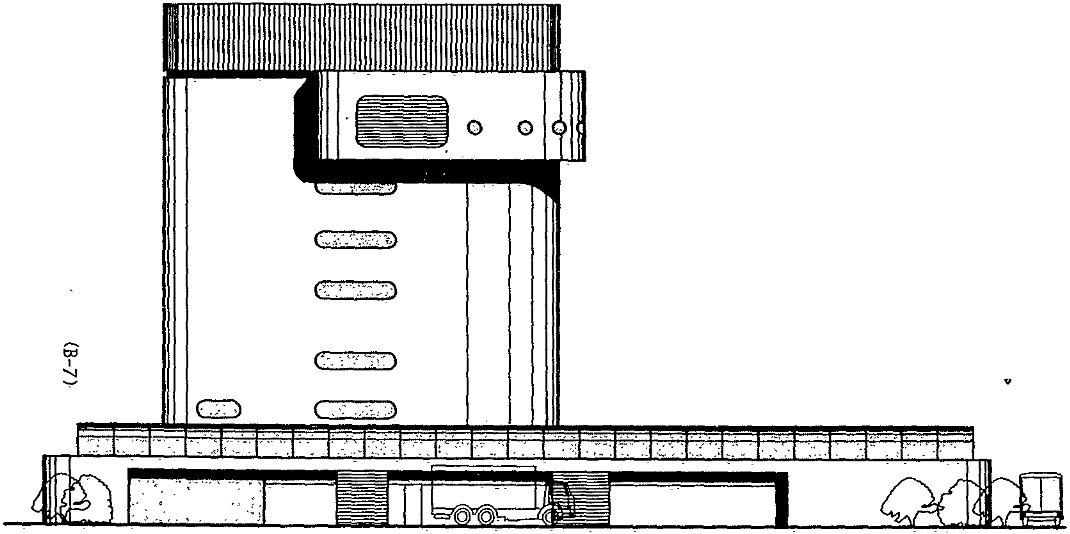
LEGEND:

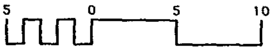
1 Officer in Charge.
2 Senior Instructor/
Administration Office.
3 Doctors Consulting Room.
4 Doctors Administration Office.
5 30 Man Classroom.
8 Escape Equipment Store.
9 Light Mech Workshop.
10 Main Machinery Room.
14 Diving Store.
19 Male Toilets.
20 Trainee's Toilets
21 Female Toilets.
24 Drying Room.
26 Passenger Lift.
27 Recompression Chamber.
28 Entrance/Reception.
29 Main Stairs.
37 Sub Station.
38 Diesel Generator.
41 Air Conditioning Plant.
44 Passage
45 Submarine Escape Module
49 Service Ducts

(B-6)



GROUND LEVEL





NORTH ELEVATION

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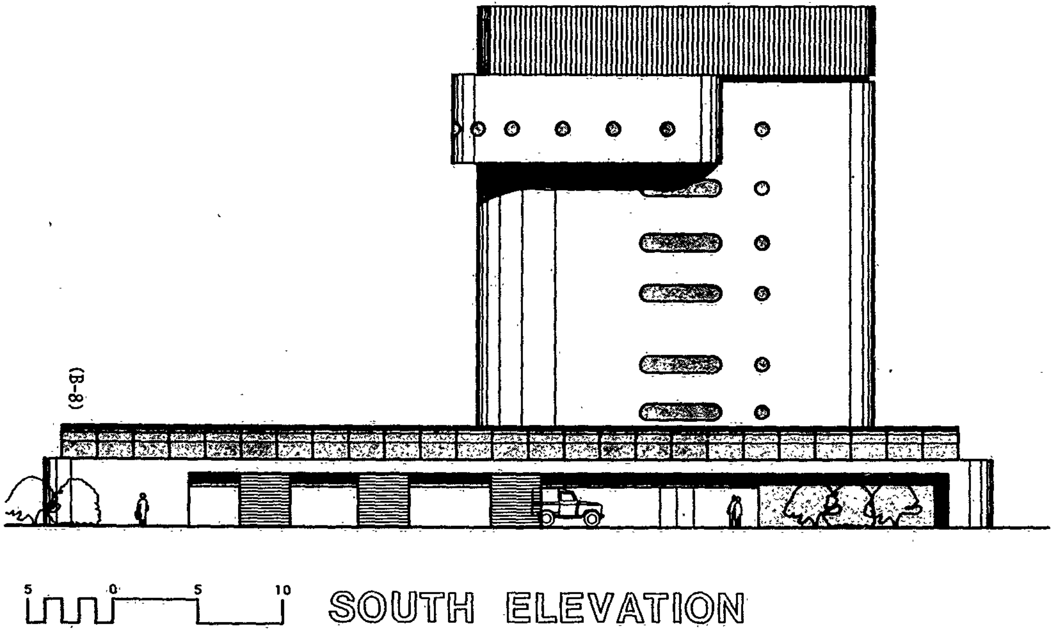
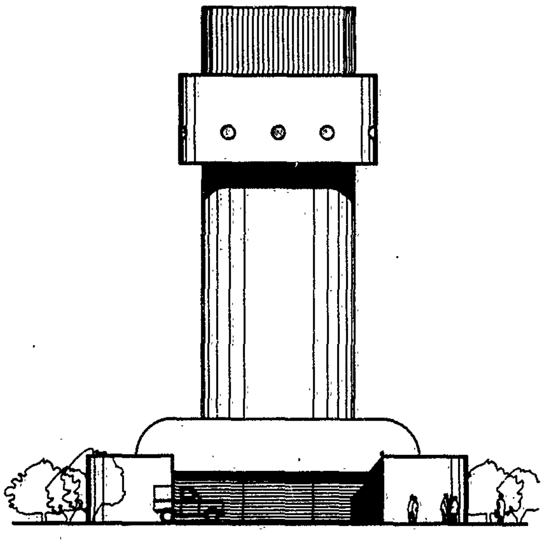


SOUTH ELEVATION



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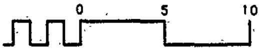

WEST ELEVATION