

Parliamentary Standing Committee on Public Works

REPORT

relating to the

CONSTRUCTION OF AIR MOVEMENTS CARGO HANGAR AT RAAF BASE, RICHMOND, N.S.W.

(Fourth Report of 1987)

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

R E P O R T

relating to the

CONSTRUCTION OF
AIR MOVEMENTS CARGO
HANGAR AT RAAF BASE,
RICHMOND, N.S.W.

(Fourth Report of 1987)

Canberra 1987

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MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

(Twenty-Eighth Committee)

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Senator Gerry Norman Jones
Senator Dr Glenister Sheil

House of Representatives

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Colin Hollis, M.P.
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Keith Webb Wright, M.P. (1)
John Saunderson, M.P. (2)

- (1) Resigned 13 February 1986
(2) Appointed 18 February 1986

EXTRACT FROM THE
VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES
NO. 153 DATED THURSDAY, 26 FEBRUARY 1967

- 2 PUBLIC WORKS COMMITTEE - REFERENCE OF WORK - CONSTRUCTION OF CARGO HANGAR, RAAF BASE, RICHMOND, N.S.W.: Mr West (Minister for Housing and Construction), pursuant to notice, moved - That, in accordance with the provisions of the Public Works Committee Act 1962, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for consideration and report: Construction of air movements cargo hangar at RAAF Base, Richmond, N.S.W.

Mr West presented plans in connection with the proposed work.

Debate ensued.

Question - put and passed.

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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

CONSTRUCTION OF AIR MOVEMENTS CARGO HANGAR
AT RAAF BASE, RICHMOND, N.S.W.

R E P O R T

By resolution on 26 February 1987 the House of Representatives referred to the Parliamentary Standing Committee on Public Works for consideration and report the proposal for the construction of an air movements cargo hangar at RAAF Base, Richmond, N.S.W.

The Committee is pleased to report as follows:

THE REFERENCE

1. The proposed work is for the construction of a new cargo handling facility at RAAF Base, Richmond.
2. The work proposed comprises:
 - the demolition of redundant facilities on the proposed site, including a diesel generator, air traffic control masts and underground services;
 - construction of a new building to house receipt, despatch, processing and storage areas, with associated administrative facilities and staff amenities;

- the provision of specialised equipment and racking to provide an automated pallet processing system; and
- construction of an access road, parking area and hardstand.

3. The estimated cost of the proposed work when referred to the Committee was \$10.34 million at February 1987 prices.

THE COMMITTEE'S INVESTIGATION

4. The Committee received written submissions and plans from the Department of Defence (Defence), the Department of Housing and Construction (DHC) and the Hawkesbury Shire Council and took evidence from their representatives at a public hearing at RAAF Base, Richmond, on 8 April 1987.

5. Prior to the public hearing the Committee inspected the existing cargo hangar at RAAF Base, Richmond.

6. A list of witnesses who appeared at the public hearing is at Appendix A.

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

BACKGROUND

8. History of RAAF Base, Richmond RAAF Base, Richmond, is located approximately 60 kilometres north-west of Sydney, between the towns of Richmond and Windsor. It covers an area of some 290 hectares.

9. In 1925, Richmond became Australia's second RAAF Base (after Point Cook, Victoria) when No. 3 Squadron was formed there. At the outbreak of World War II, Nos. 3, 6, 9 and 22 Squadrons, and No. 2 Aircraft Depot were based at Richmond. During the war, it developed into a base of major importance. Since World War II, large scale development has continued. A Corrosion Control Facility costing around \$10 million has been completed recently and is used for paint stripping and repainting aircraft. This facility is used on a daily basis and accommodates all sizes of aircraft.

10. The following units are based at Richmond:

Airlift Group made up of two wings:

- 86 Wing which comprises:
 - . Nos. 33, 36 and 37 Squadrons;
 - . No. 486 Maintenance Squadron;
 - . Air Movements Training and Development Unit;

- Base Support Wing which comprises:
 - . Administrative Support Squadron;
 - . Supply Support Squadron;
 - . Operational Support Squadron;
 - . No. 3 RAAF Hospital;
 - . No. 22 City of Sydney Squadron RAAF Reserve; and
 - . Operational Command Band.

- Movement Co-ordination Unit;
- No. 38 Squadron;
- Air Transportable Telecommunications Unit;
- No. 2 Aircraft Depot;
- No. 2 Airfield Defence Squadron;
- Air Transport Support Regiment - Army; and
- No. 68 Ground Liaison Section - Army.

11. The current Air Force establishment at Richmond is 2505. Defence advised that it is not envisaged that the number of personnel would increase due to construction of the facility.

Second Sydney Airport

12. The Committee queried the possible impact on flying activities at the base of a second Sydney airport which is proposed at Badgerys Creek, some 30 kilometres to the south of the base. Defence believe that the second airport could have an impact on flying activities with respect to training functions. Richmond, as well as being the main air head for air cargo movements, has a flying training role for Hercules pilots. Should the airport proceed at Badgerys Creek, the airspace used for training activities could be reduced. As a result certain training activities will need to be constrained. Defence does not, however, envisage any difficulties before the year 2000.

Cargo Handling

13. Richmond is the main operational transport base for the RAAF. The air movements section is the main distribution centre for air cargo for shipment to and from other RAAF bases and overseas locations. The air movements section is also the sole bond storage facility in the RAAF.

14. The movement of cargo is co-ordinated by the movement control centre at Richmond. Space is allocated on available aircraft according to the priority of the cargo. The air movements section is then advised of cargo that has been allocated space. Some space is reserved if high priority cargo is to be collected at another Air Force base en route. The aircraft pallets are then made up in accordance with these priorities and prepared for loading on the first available aircraft tasked to those destinations. Certain destinations may have scheduled services as often as three times a week. If unallocated space is

available then it would be used by the air movement section for available cargo. The operation is co-ordinated at the highest possible level by the Movement Co-ordination Centre which receives requests from the Army, Navy and Air Force for the movement of cargo through the air movement system.

15. Cargo is handled at four priority levels. The Committee was informed that a system operates within the Defence Force which assigns priorities according to the activity of the unit requiring the equipment moved and by the urgency of need. Equipment passing through the air movements section is annotated with the priority on which it is being moved. This imposes a timescale that a particular piece of equipment should be in transit before reaching the customer destination. Within Australia the highest priority is a total of five calendar days while the lowest priority is a total of 45 calendar days. Cargo is regularly consigned to various destinations including RAAF Bases Amberley, Darwin, Edinburgh, East Sale, Fairbairn, Laverton, Pearce, Townsville, Wagga, Williamstown, and overseas (e.g., Butterworth, United States).

16. Cargo statistics are attached at Appendix D and show the amount of cargo processed annually since 1962 when the hangar was first allocated to the function. Since 1981 the amount of cargo processed has stabilised around 10 million kilograms annually. However, during exercise activities, the cargo handled may peak to 230,000 kilograms daily. On these occasions it may be necessary to store cargo externally.

TYPES OF CARGO

Bonded Cargo

17. All Defence cargo entering Australia from overseas is held in bond at Richmond until cleared by Customs. This cargo includes personal effects of families returning from overseas. It is then

forwarded to the person or department responsible. Goods stay in bond for an average of two weeks. Permanent Customs officers are located on the base.

Hazardous Cargo

18. Defence advised the most hazardous cargo stored is explosives. However, many items are classified as 'hazardous', including gases, flammable liquids, flammable solids, oxidising agents, toxic and poisonous and infectious substances, radioactive and corrosive substances and miscellaneous dangerous cargo. All are classified and stored according to their compatibility.

Valuable and Attractive Items

19. Valuable and attractive items include watches, swords, chronometers and pieces of expensive equipment. It may be necessary to hold these items for several days, depending on flights to their destinations.

THE NEED

20. RAAF Base, Richmond, will continue as the base of the air transport fleet. It is the nearest available RAAF airfield to the main RAAF Stores Depot at Regents Park, 40 kilometres away.

Existing Facility

21. Cargo handling operations are currently carried out in hangar no. 308, a Bellman hangar built in 1955 and allocated to this function in 1962. From 1955 to 1962 the hangar was used as a storage building. The building's floor area is approximately 2,000 square metres of which 1,700 square metres is used by the RAAF while the United States Air Force (USAF) uses the remainder for its cargo handling operations. An extension was built in 1983

at the request of the USAF. This extension was funded by the USAF and provided an additional covered area of approximately 400 square metres for cargo handling and processing.

Problems with Hangar 308

22. Defence believe that cargo operations are conducted under most unsatisfactory conditions in hangar 308.

23. The major problems are:

- cargo cannot be effectively segregated by priority or destination;
- large items must be stored outside the hangar and exposed to the elements with some consequent deterioration;
- considerable double handling of cargo is necessary;
- there is inadequate manoeuvring area for large capacity forklifts used for handling aircraft pallets; and
- hazards exist to personnel and damage occurs to cargo because forklifts are operating in confined spaces.

24. The above problems are aggravated by lack of office space for the cargo officer and his staff as well as lack of staff amenities. Traffic congestion occurs due to the hangar having only one entrance and exit.

25. Committee's Conclusions The Committee agrees that a need exists to improve the efficiency of cargo operations at RAAF Base, Richmond. The present hangar is unsatisfactory for the amounts of cargo presently handled.

OPTIONS CONSIDERED

26. Several options were considered by Defence when developing the proposal. The key issues which affected the selection of the design of the facility and of a materials handling system to be incorporated in the facility were:

- the improvement of the efficiency of normal RAAF cargo operations;
- minimisation of damage to cargo through the introduction of modern cargo handling techniques. This can be achieved by handling cargo on aircraft pallets that can then be moved and stored while captive within the system; and
- developing a cargo handling facility that would enhance the RAAF's ability to interface with civilian operators.

27. In preparing a design for an air cargo handling facility it was necessary that the building design be totally integrated with the materials handling system to be incorporated in it. The operations on the 'land' side of all alternatives considered were similar and involve the loading and unloading of vehicles in the receipt and despatch of road cargo. Similarly the areas required for the make-up and break-down of air cargo loads requires similar facilities in all the alternatives.

28. The major differences between the alternatives considered are in the systems to be adopted for the handling, storage and despatch of made up cargo loads on the aircraft and their effect on the building concept.

29. The materials handling system proposed for incorporation in this facility comprises elements that conform to recommendations of the International Air Transport Association (IATA). Such

recommendations are aimed primarily at standardising handling equipment and the safety of goods, aircraft and people involved in air cargo handling. IATA specifically recommends against the use of forklift trucks.

30. Four of the original five options incorporated various combinations of transfer vehicles (TV) and elevating transfer vehicles (ETV), and following comparative analysis of these options, a sixth proposal was developed (Appendix C). This sixth proposal (Scheme F) was essentially a further development of Scheme E, and is the present proposal.

31. The proposal has the same building frontage length as Scheme E, but sets the facility further from the aircraft parking apron to decrease noise level in the new building and to provide a manoeuvre area for the 'TALU' (Transportable Aircraft Loading Units).

32. Appendix C gives details of the major differences between the options including the differences in capital cost and equipment running costs. It should be noted that comparisons took place at an early stage in design development and the estimates at that stage were only indicative and were based on minimal design work.

33. Scheme F is the preferred option as:

- noise will be lessened due to the building being set back 30 metres from the existing apron;
- it uses only one TV and one ETV with a consequent saving in both capital cost and annual running and maintenance costs;
- there is minimal cost penalty for future expansion of the racking system; and

- if the ETV or TV is out of action for service or repairs, the existing 'TASLU' equipment can be used as back-up.

34. Committee's Conclusion The Committee agrees that Option 6 - Scheme F would be the most acceptable option.

THE PROPOSAL

The Facility

35. It is proposed to construct a hangar of approximately 2,750 square metres floor area housing a commercial, mechanised pallet storage and retrieval system with separate functional areas for identified routine cargo operations. The cargo facility (commencing from the air side) would comprise:

- three cargo ports, for the transfer of pallets to and from aircraft cargo handling vehicles operating on the tarmac. Two ports are for handling single pallets and the other for a multiple pallet assembly of up to four pallets in size.
- a rail-guided Elevating Transfer Vehicle (ETV) travelling along a six metre wide aisle formed by two rows of double pallet storage racks, three tiers high. The ETV is to carry two pallets and access each storage rack.
- a rail-guided Transfer Vehicle (TV) operating in an aisle formed by one row of the pallet storage racks and a row comprising pallets standards, two pallet building pits and a multiple pallet stand. The TV is to act as a bridge between the pallet building pits and the storage racks.

- separate areas for receipt, hold and despatch of road cargo, build up and break down of palletised cargo and an area with an overhead monorail crane for handling oversize cargo.
- special areas for sorting and handling bonded cargo, and hazardous cargo.
- a mezzanine block housing offices, staff amenities and storage areas for valuable and attractive items, classified equipment and cargo handling equipment.
- separate covered entrances for the receipt and despatch of road cargo, access roads and sufficient sealed area for manoeuvring and parking of cargo vehicles.

36. The pallet storage racks will provide for 84 single pallet spaces for general cargo, and 24 pallet spaces each for bonded cargo and hazardous cargo. The number of pallet racks is based on an analysis of backlog cargo and cargo received and should satisfy 75 per cent of the predicted peak demands. Adjoining the eastern side of the hangar a covered area is proposed for storage of outside cargo and for use during large scale troop and vehicle movements. The cargo handling system is designed for the implementation of manual procedures in the event that the ETV becomes non-operational owing either to the need for maintenance or a mains power failure. The design of the facility allows for the extension of the storage racks to the east if required. A computer based management system is to be provided to assist in cargo management. This is to be funded separately as it is not integral to the facility.

Siting

37. The building will be set back 30 metres from the existing apron and approximately 32 metres away from the existing Passenger Terminal. Access to the facility will be achieved via a new ring road branching off Cobby Street. Ready access to the flight line apron will prevent multiple handling of aircraft pallets between the aircraft and the cargo facility. Multiple handling is not only inefficient in terms of time and cost but also entails a high risk of damage in transit. Flight line siting of the facility would enable the existing specialised aircraft loading/unloading vehicles operating on the apron to have direct access to the facility for transportation of loaded aircraft pallets from the facility in one operation, thus eliminating the attendant inefficiencies associated with multiple handling if the facility were sited remote from the apron.

Noise Impact

38. The building will be constructed further back from the runway than the present cargo hangar. This will allow manoeuvrability of the loading and unloading vehicles and will lessen noise in the hangar. High racking storage of pallets of goods awaiting shipping will be between the main working areas and the apron. This will further serve to lessen the noise within the building. However, at peak times, noise from engines will affect the workforce, but this can be mitigated by closing some of the doors. Defence advised that base management recognised that this is a high noise area and personnel are equipped with earmuffs. It is mandatory to use these earmuffs in the prescribed area.

Future Use of Hangar No. 308

39. It is proposed that the 1700 square metres of space vacated in hangar no. 308 will be used primarily to store ground servicing equipment which is currently left out in the open and is deteriorating due to weather. A secondary role will be to accommodate stores used for large-scale exercises or disaster relief assistance.

40. The USAF will continue to process its own cargo through the existing facilities and has its own personnel, materials handling and cargo loading equipment. Operations are carried out independently of the RAAF. The inventory of items is not sighted by the RAAF but is sighted by Customs. Under the co-operative airlift agreement between the RAAF and the USAF, no rent is paid.

41. Although the USAF throughput only averages 60,000 kilograms a week the Committee believes that discussions should have been held between the RAAF and the USAF to ascertain if the USAF was interested in the possibility of a joint facility. At the suggestion of the Committee Defence agreed to invite the USAF to participate in the construction of the new hangar. However, the USAF has advised that its requirements can be met through the existing facility.

42. Committee's Conclusion Construction of a hangar 30 metres from the existing apron will result in greater manoeuvrability for vehicles than is possible at present. Noise will also be lessened in the hangar. The design of the facility allows for the extension of the storage racks to the east if required.

CONSULTATIONS

43. Defence confirmed that consultations had not taken place with the Hawkesbury Shire Council over the proposed construction. This was due to the facility having little environmental impact, basically because it is a continuing function on the base. However, Defence stressed that it is conscious of the importance of consultation and will endeavour to ensure that consultations take place in the future.

ENVIRONMENTAL CONSIDERATIONS

44. The proposal has been assessed by Defence in accordance with the Administrative Procedures under the Environment Protection (Impact of Proposals) Act 1974 and found to comply without adverse environmental impact.

Noise

45. Defence agreed that noise continues to be a problem, as around every military establishment which has an airfield on it. Although a number of complaints are received from time to time, Defence believes that it maintains good relationships with the community. The Hawkesbury Shire Council set up an environmental noise committee approximately two years ago. It consists of members of the council and local community, as well as a member of the RAAF. Its function is to be a liaison group so that each group is aware of what the other groups are doing in respect of mitigation of noise and general movements. However, no tests have been undertaken on actual noise, as an insufficient number of complaints has been received.

LIMIT OF COST

46. The limit of cost estimate is \$10.34 million at February 1987 prices.

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

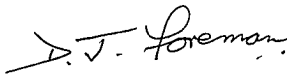
RECOMMENDATIONS AND CONCLUSIONS

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

	<u>Paragraph</u>
1. The Committee agrees that a need exists to improve the efficiency of cargo operations at RAAF Base, Richmond. The present hangar is unsatisfactory for the amounts of cargo presently handled.	25
2. The Committee agrees that Option 6 - Scheme F would be the most acceptable option.	34
3. Construction of a hangar 30 metres from the existing apron will result in greater manoeuvrability for vehicles than is possible at present. Noise will also be lessened in the hangar. The design of the facility allows for the extension of the storage racks to the east if required.	42
4. The limit of cost estimate is \$10.34 million at February 1987 prices.	46

5. The Committee recommends construction of the work in this reference.

47

A handwritten signature in black ink that reads "D.J. Foreman". The signature is written in a cursive style with a long horizontal stroke at the beginning.

(D.J. FOREMAN)
Chairman

Parliamentary Standing Committee
on Public Works
Parliament House
CANBERRA

27 May 1987

LIST OF WITNESSES

Mr G.F. Falson, Chief Town Planner, Hawkesbury Shire Council,
New South Wales

Wing Cdr R. Fardon, Commanding Officer, Supply Support Squadron,
Department of Defence, RAAF Base, Richmond, New South Wales

Group Captain J.F.G. Kennedy, Acting Director-General Facilities,
Air Force, Department of Defence, Russell Offices,
Canberra, Australian Capital Territory

Mr J.J. Kennedy, Assistant Chief Mechanical Engineer, Department
of Housing and Construction, Central Office,
470 Northbourne Avenue, Canberra, Australian Capital
Territory

Mr R. Mallam, Project Manager, Projects Division 2, Department of
Housing and Construction, New South Wales Region, Tower
Building, Australia Square, Sydney, New South Wales

Mr P.D. Nemeth, Works Plans B/C, Department of Defence,
Russell Offices, Canberra, Australian Capital Territory

Mr R.E. Rosen, Associate Director, Projects Division 2,
Department of Housing and Construction, New South Wales
Region, Tower Building, Australia Square, Sydney, New South
Wales

CONSTRUCTION DETAILS

MATERIALS AND FINISHES

Building Structure

The substructure will consist of a stiffened raft slab under the pallet racking system and concrete pavement in the receipt/despatch areas.

The superstructure will consist of a braced steel frame to both the pallet packing system and receipt/despatch areas.

The concrete pavement slabs will be designed for fully laden forklift trucks weighing up to 20 tonnes.

The structure will be designed to satisfy appropriate wind codes and will take into account the effect of propulsion wash and jet blast from the adjacent aircraft parking area.

Materials and Finishes

- External

The building will be clad externally with pre-finished metal cladding of selected colour.

The roof material will be pre-finished metal deck with sarking, insulation and roof vents.

Other external finishes include:

Windows - double glazed anodised aluminium;

Louvres - anodised aluminium;

Doors

- . Cargo doors - electrically operated roller shutters;
- . Maintenance access for elevating transfer vehicle (ETV)
- steel framed and clad, electrically operated sliding doors.

- Internal

Internal finishes have been chosen to satisfy specific functional requirements. Generally, these comprise:

Floors

- . Cargo areas - steel trowel concrete slab on grade;
- . Offices - carpet on concrete slab;
- . Toilets - ceramic tiles;
- . Hazardous cargo - epoxy finish on concrete.

Walls

- . Ground floor - concrete finish painted to defined rooms;
- pre-finished metal deck including framing;
- . First floor - concrete block painted to amenities, offices and plant room.

Ceilings

- . Offices - plasterboard;
- . Storage Rooms - concrete finish painted;
- . Cargo Areas and Pallet Racking - underside of insulated roofing exposed.

Technical Standards

The design complies with the relevant Australian Standards, Codes, State Ordinances and Supply Authority regulations.

ENGINEERING SERVICES

Materials Handling

The materials handling will comprise a commercial mechanical pallet storage/retrieval system as follows:

- A pallet storage facility comprising a steel super-structure with motorised roller 'shelves', which is three tiers high with double rows on either side of a centre aisle.
- A motorised elevating transfer vehicle (ETV) which stores/retrieves pallets from the storage facility. This vehicle will be positioned in the centre aisle.
- Work stations comprising a steel structure (at floor level) with motorised roller 'shelves' on which pallets are assembled or broken down. These work stations incorporate two scissor lifts to enable build up of pallets at safe working heights.
- A transfer vehicle (TV) which will transfer pallets to/from the work station to the storage facility.
- A truck dock motorised roller 'shelf' which will enable direct loading/unloading of pallets to/from trucks.
- Three cargo docks containing motorised rollers to transfer pallets to aircraft from the storage facility.

Mechanical Services

- **Air Conditioning**
Air conditioning will be provided to the office areas and the elevating transfer vehicle (ETV) to provide appropriate comfort conditions for personnel.

- **Heating**
Gas heating will be provided to the work stations and 'the Staff Room' to provide comfort conditions for personnel.

- **Ventilation**
Mechanical exhaust ventilation will be provided to the staff amenities area.

- **Hot Water**
Hot water will be provided to each sink/basin/shower.

- **Fire Protection**
All areas will be provided with a wet head sprinkler system. It will be integrated with the area fire alarm system.
Fire hydrants and hose reels will be provided as well as portable fire extinguishers where appropriate.

- **Hoist**
A hoisting facility will be provided to load/unload road cargo.

Electrical Services

- **Light and Power**
Internal light and power will be provided in accordance with relevant Australian Standards, State Ordinances and Supply Authority regulations.

- **Static Earthing**
Anti-static floor will be provided to the Hazardous Cargo Storage and Sorting Area.

- **Telephones**
Conduits for telephone connections will be provided.

- **Battery Charging Unit**
As electrically operated forklifts will be operating within the building, a battery charging facility will be provided. It will be capable of recharging several forklifts overnight. It is to be located within the external covered storage area.

- **Fire Alarms**
In addition to sprinklers, smoke detectors will be provided to the substation and switchroom and these will be connected to the Police Services Building and the Base Fire Brigade. The remainder of the building is protected by sprinklers.

- **Site Services**
The electrical high voltage grid has sufficient capacity to cope with the additional load to supply this facility. An indoor substation will be provided to serve the building.
The substation will be fed from the existing underground high voltage grid.

Hydraulic Services

- **Sewerage Services**
The new facility will connect to the Base reticulation which has adequate capacity.

- **Stormwater Services**

An open stormwater drain currently situated on the site will be relocated, upgraded and laid underground. Drainage from the roof and pavements will necessitate the upgrading of downstream pipework.

- **Domestic Cold Water Supply**

Adequate water services are available for domestic purposes and the building requirement does not involve any special considerations.

- **Gas**

The hangar will be connected in accordance with the appropriate Regulations and Australian Standards for gas installations.

Civil Works

- **Vehicle Access**

Vehicular access to parking facilities and hardstands for cargo trucks will be achieved by a proposed ring road system branching off Cobby Street.

Carpark design caters for:

- 4 light passenger vehicles;
- 2 5-tonne trucks; and
- 1 semi-trailer.

Vehicular traffic has been separated from pedestrian movement generated by the passenger terminal.

- **Pavements**

Bitumen hardstanding will be constructed to the ramp and areas between the building and aprons on the South side. The access roads and other heavy movement areas will also comprise bitumen finish.

- **Landscape**

A variety of high and low level screening will be provided on the north and east facades of the proposed hangar.

As well as screening the different functioning areas on and around the site, the planting will aid in bridging the scale difference with neighbouring buildings.

Fire Hydrant and Sprinkler Supply

It will be necessary to augment the existing water supply system for the Base to provide adequate water supply in accordance with the appropriate standards for fire-fighting services and the assessed risk. The water main under the site of the proposed building will be relocated.

Security

- The hangar will be protected by an intruder alarm system connected to the base police services building.

- The walls and ceiling of the classified equipment storage area, the valuable and attractive storage area and the safe hand storage room will be of reinforced concrete.

- The bonded cargo area within the building will be secured with a chain mesh enclosure.

TABLE OF MAJOR COMPARISONS BETWEEN ALTERNATIVES CONSIDERED

	Scheme A	Scheme B	Scheme C	Scheme D	Scheme E	Proposal (Scheme F)
Building Size						
. Area of building square metres	4450	4450	6255	5050	3800	3800
. Area of pavements square metres	6000	6000	6100	6900	4100	6600 (See Note 3) (See Note 4)
. Racking height	3 tier	3 tier	1 tier	2 tier	3 tier	3 tier
Provision for Expansion	Yes - vertical to 4 tiers	Yes - vertical to 4 tiers	No	No	Yes - horizontal extension to racking	Yes - horizontal extension to racking
Racking Operations						
. Transfer vehicles	2	2	-	2	1	1
. Elevating transfer vehicles	2	2	-	2	1	1
. New mobile equipment (additional to other schemes)	-	-	4 fork-lifts	2 fork-lifts	-	-

	Scheme A	Scheme B	Scheme C	Scheme D	Scheme E	Proposal (Scheme F)
Cargo transfer to Aircraft	TALU/TASLU	TALU/TASLU	Forklift/ TALU/TASLU	TALU/TASLU	TALU/TASLU	TALU/TASLU
Size and number of pallets per storage bay						
. Commercial (larger)	2	2	2	2	1	1
. Military	2	2	2	2	2	2
Automation	Fully automated	Fully automated	Not possible	No provision	No provision	Semi automated
Estimated costs adjusted to February 1987 prices (See Note 1)	\$15.0m. Indicative Cost	\$13.5m. Indicative Cost	\$8.5m. Indicative Cost	\$13.0m. Indicative Cost	\$10.0m. Indicative Cost	\$10.34m. Limit of Cost
Additional annual running costs compared to least expensive (Scheme C)	\$45,000	\$45,000	Base (See Note 5)	\$75,000	0	0
						(See Note 5) (See Note 5)

Notes to Accompany Table

- Note 1 The Indicative Cost is a first cost indication based on minimal design and investigation.
- Note 2 "TALU" refers to Transportable Aircraft Loading Unit.
 "TASLU" refers to Transportable Aircraft Side Loading Unit.

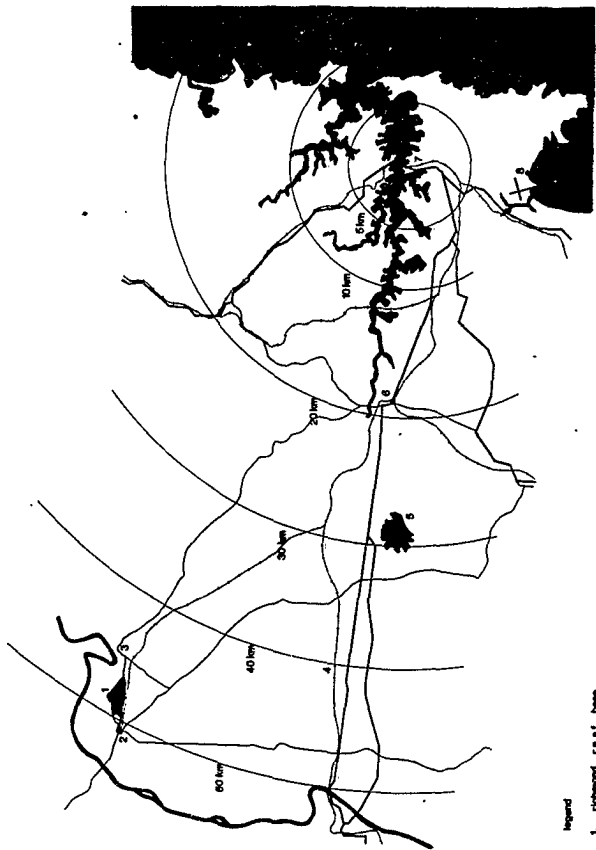
 Both of these units were demonstrated to the Committee during the site inspection.
- Note 3 Scheme E has a significantly less pavement area because the length of building frontage along the apron is much less than that of Schemes A, B, C and D.
- Note 4 The proposal (Scheme F) has the same length of building frontage as Scheme E, but the facility has been set further from the aircraft parking apron to decrease the noise level in the new building and to provide a manoeuvre area for the "TALU".
- Note 5 The least cost scheme, Scheme C, is the base cost for comparison. Schemes E & F have the same annual running costs as Scheme C.

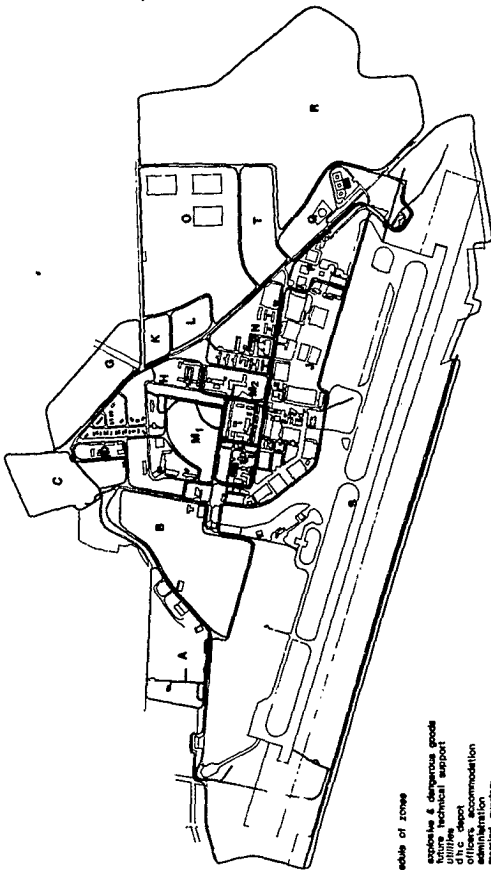
CARGO PROCESSED

<u>YEAR</u>	<u>KILOGRAMS</u>
	2, 197, 460
1962	2, 754, 976
1963	2, 931, 132
1964	2, 981, 783
1965	3, 174, 975
1966	5, 848, 503
1967	9, 282, 518
1968	9, 284, 963
1969	8, 098, 308
1970	12, 632, 950
1971	13, 539, 953
1972	13, 780, 945
1973	17, 423, 182
1974	15, 554, 366
1975	16, 818, 878
1976	15, 910, 559
1977	15, 416, 016
1978	15, 972, 487
1979	15, 292, 489
1980	12, 889, 630
1981	10, 931, 053
1982	12, 186, 958
1983	10, 035, 160
1984	10, 027, 150
1985	9, 944, 043
1986 Jan-Oct	7, 736, 532

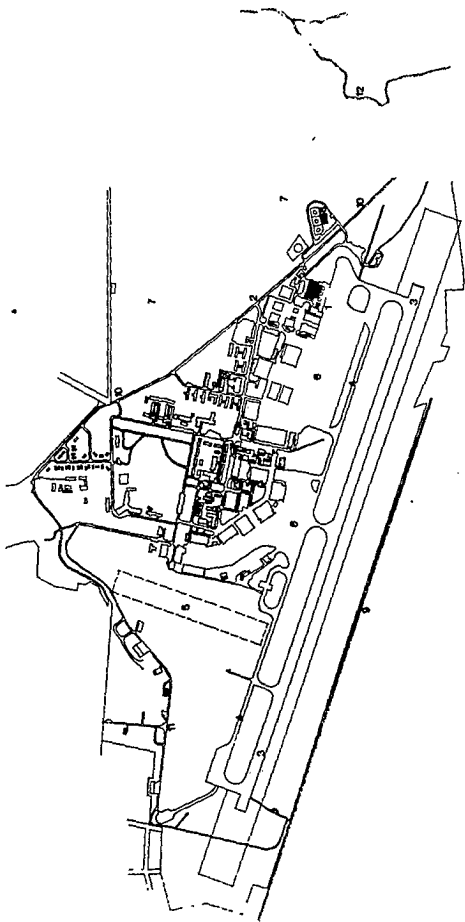
ILLUSTRATIONS

Location Plan	E-1
Zone Plan	E-2
Site Plan	E-3
Area Plan	E-4
Floor Plan	E-5
Elevation Plan	E-6
North Elevation	E-7
South Elevation	E-8

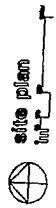


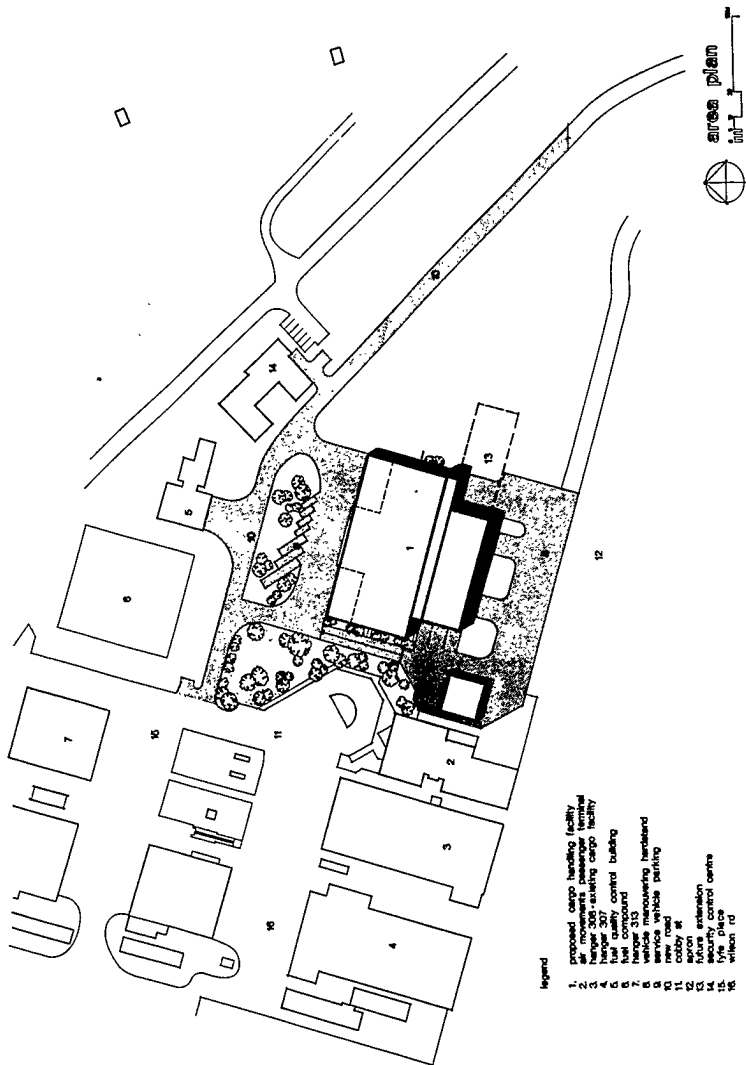


- schedule of zones
- A explosives & dangerous goods
 - B fuel
 - C technical support
 - C utilities
 - C d/hc depot
 - E administration
 - F accommodation
 - G married quarters
 - H married quarters
 - I married quarters
 - J communications & airwomens accommodation
 - J technical support
 - K medical facilities
 - K community facilities
 - L recreation
 - L M/c
 - M weather
 - N accommodation
 - N sports platform
 - O air movements & transport
 - P fuel storage & hazardous stores
 - R technical support
 - S airfield & aircraft operations
 - T airfield defence facilities



- Legend
- 1 air movements section
 - 2 base utility
 - 3 runway
 - 4 taxiway
 - 5 grass strip
 - 6 grass strip runway
 - 7 aircraft apron
 - 8 aircraft taxiway
 - 9 bulk fuel
 - 10 windbar rd
 - 11 parcel st
 - 12 runway



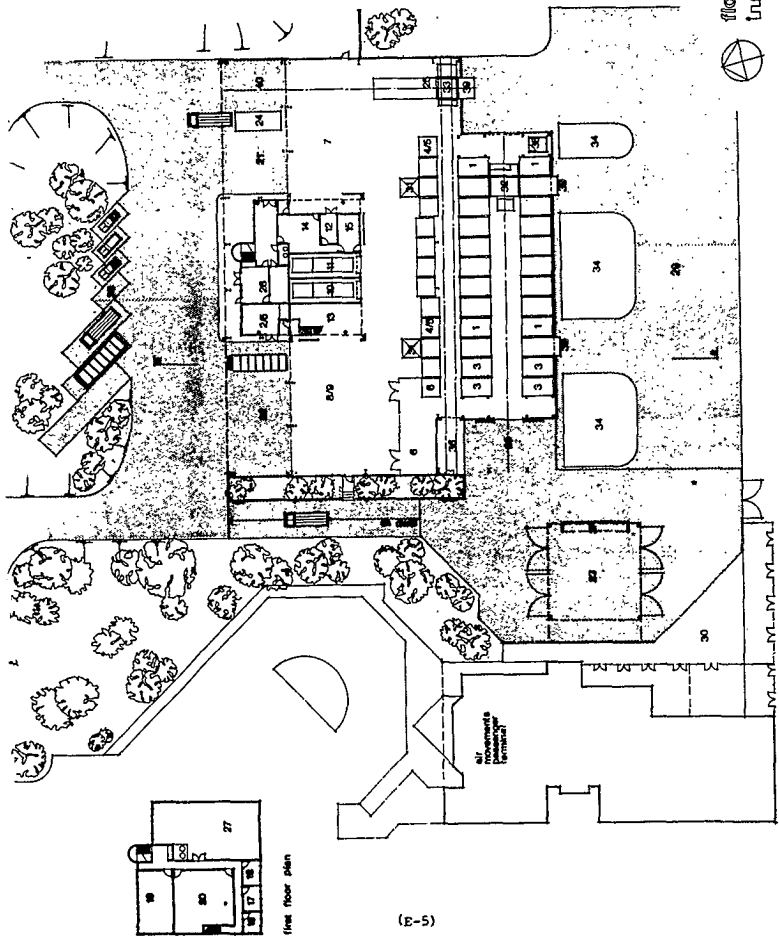


Legend

1. proposed cargo handling facility
2. air movements passenger terminal
3. hangar 308 - existing cargo facility
4. hangar 313 - existing cargo facility
5. fuel compound
6. fuel compound
7. hangar 313
8. new passenger terminal
9. service vehicle parking
10. cobby at
11. new road
12. air movements passenger terminal
13. security control centre
14. security control centre
15. life piece
16. within 10

Legend

1. general cargo storage
2. hazardous cargo storage
3. pallet build up break down
4. hazardous cargo sorting
5. hazardous cargo sorting
6. inbound road cargo sorting
7. outbound road cargo holding area
8. customs cargo sorting area
9. U.S. storage area
10. make hand area
11. cargo handling equipment storage
12. central transportation section
13. CTO office
14. CTO office
15. enco ic office
16. nco ic dangerous cargo
17. staff room
18. staff restrooms
19. staff break room
20. covered area
21. truck dock trailer unit
22. covered pallet
23. plant room
24. service vehicle parking
25. vehicle maneuvering turnaround
26. vehicle maneuvering area
27. scanner truck
28. elevated trailer vehicle (4x)
29. trailer vehicle (1x)
30. game area
31. tv parking bay
32. battery charging area
33. toilet
34. rest port
35. entrance

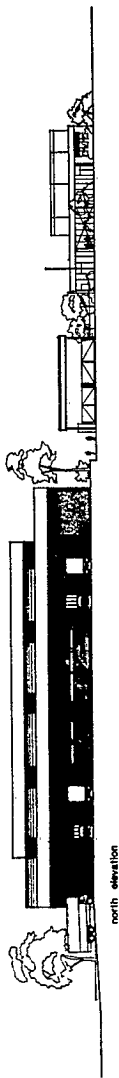


floor plan




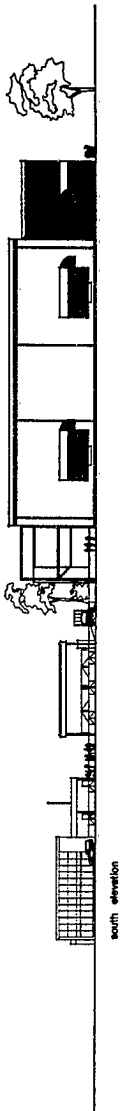
elevation
section

(E-7)



north elevation





south elevation