'COMMISSARIAT'

MARITIME MUSEUM

CLIFF STREET, FREMANTLE

WESTERN AUSTRALIA

by Gordon Palmoja

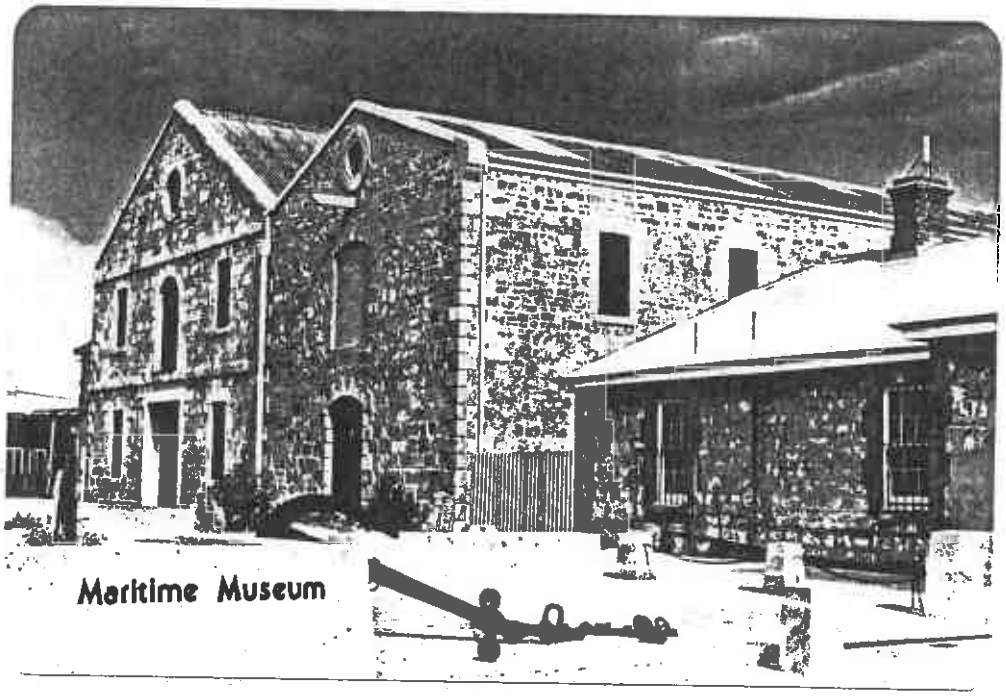
PUBLIC WORKS DEPARTMENT
ARCHITECTURAL DIVISION
W.E. BATEMAN F.R.A.I.A.
A/PRINCIPAL ARCHITECT

ACKNOWLEDGEMENTS

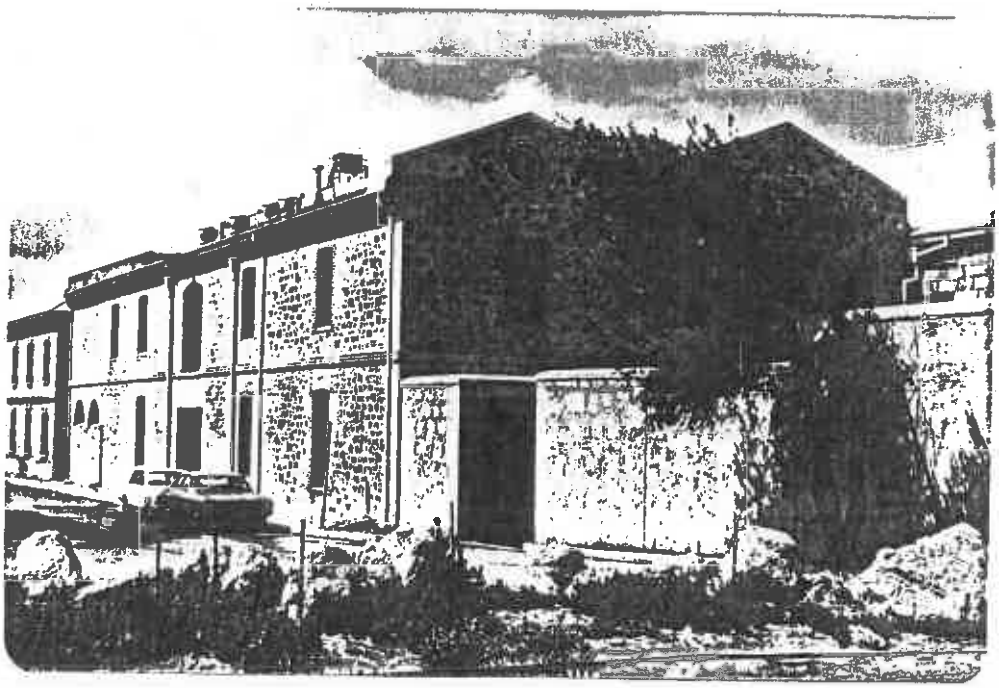
This presentation was compiled from much historical material and with generous assistance - for which I am very grateful - from Dr. Ian Crawford and members of the Western Australian Museum.

I am indebted to all Architects, Structural, Mechanical and Electrical Engineers and all members of the staff of the Public Works Departments Architectural Division who have been connected with this restoration programme and have assisted me in preparation of this paper.

Gordon Palmoja, F.R.A.I.A., A.R.I.B.A.
Project Architect, Public Works Department,
Perth, Western Australia.



South elevation of completed
Stage 1.



North elevation of completed
Stage 2.

HISTORY

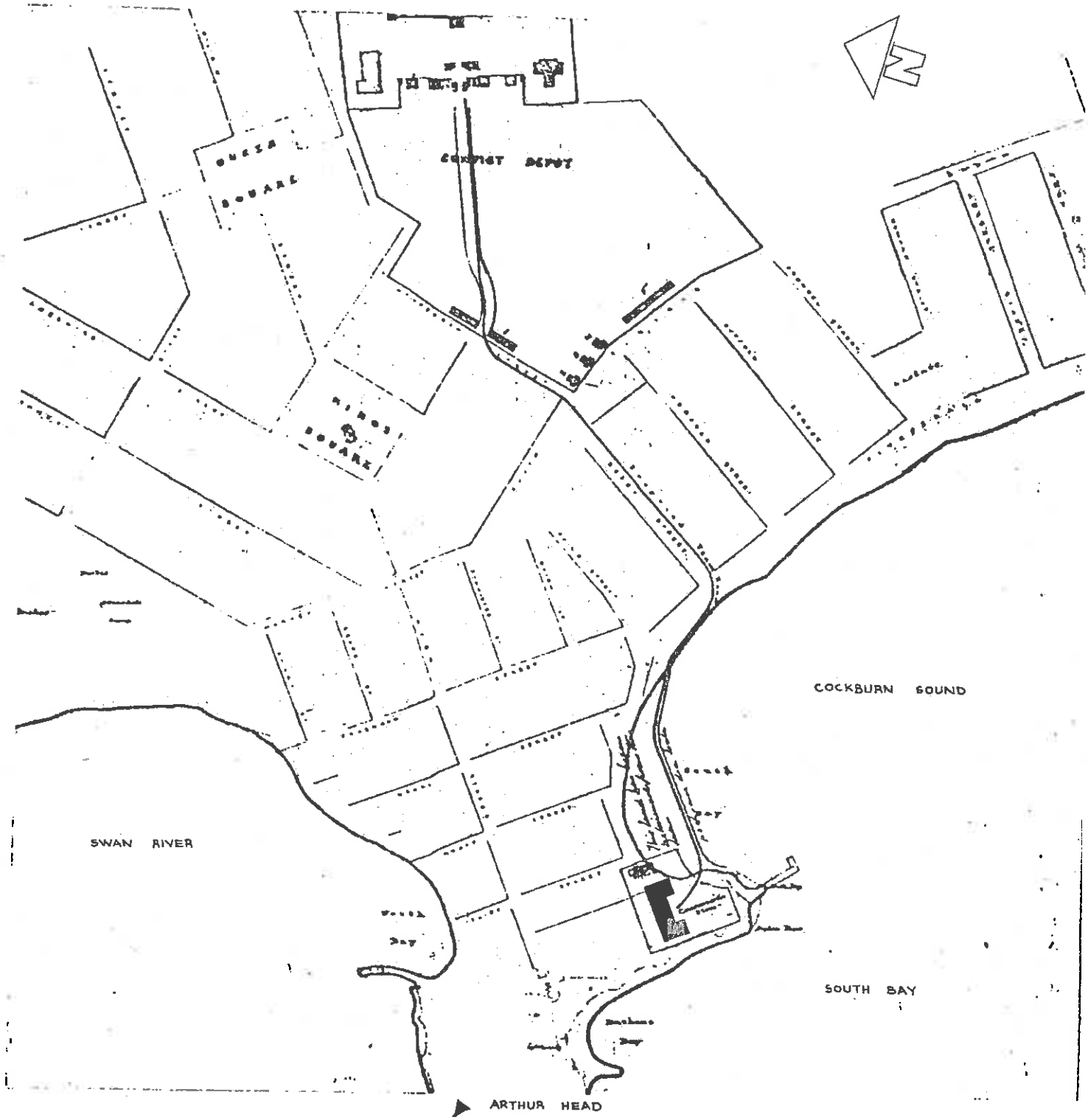
Captain Charles H. Fremantle took formal possession of the West Coast of Australia - or as it was called then, New Holland - on May 2nd 1829, on landing on Arthur's Head - a stone's throw from the site of the subject of this paper.

The establishment of the colony progressed slowly for the next 20 years and the first of the States historical buildings were founded at Fremantle, Perth and Guildford.

With the arrival of convicts in 1850, the administration embarked on an expanded building programme. The prison was commenced in 1851, together with warders' cottages, barracks for the Pensioner Guards, and residences for convict establishment officials. In June 1851, Governor Fitzgerald advised the Colonial Office in Britain of his intention to commence the immediate construction of a commissariat store.

The building was designed by James Manning, Clerk of Works. The plans envisaged a large building with three parts. The first wing, the "A" Store which is now the main entrance of the Maritime Museum, was to be extended by two more sections to form a "U" shaped building. The second section, the "B" Store was built in 1860-62, but the third wing was never started, and the land on which it was proposed is now occupied by the railway line. Together with the main store were small offices on Cliff Street completed in 1851-52. A horse-drawn waggon, which ran on a tramway, linked the Commissariat with the Prison. On it, goods were taken up the hill to the Prison, and it is possible that the stone used in the Commissariat was quarried near the Prison and brought to the site on this tramway.

The buildings were constructed mainly by convict labour but there was an acute shortage of skilled tradesmen which seriously delayed the building progress,

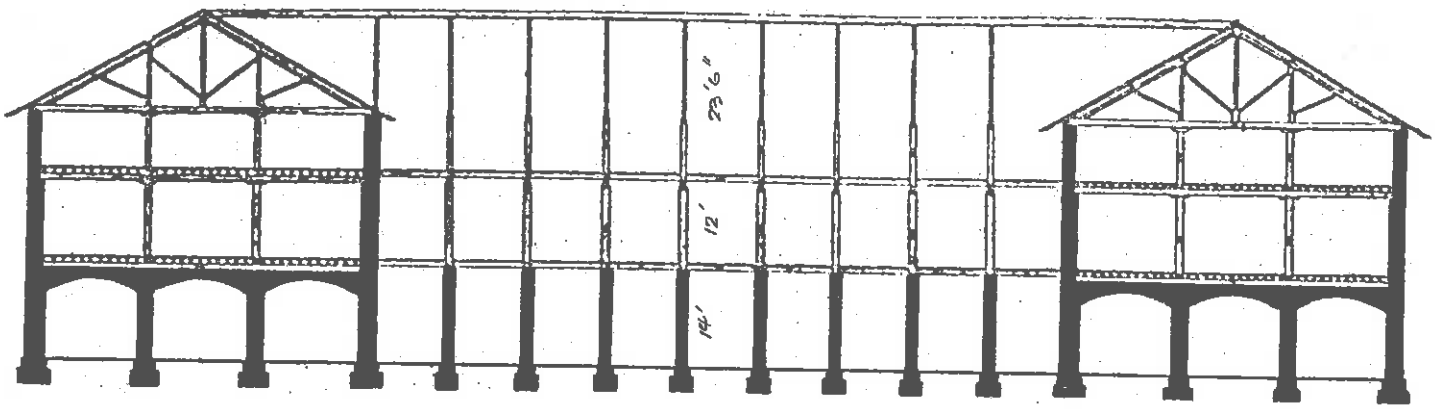


Plan from Colonial Records, CO 18 Original Correspondence Despatch No 125, 1 Nov 1851 in Battye Library.

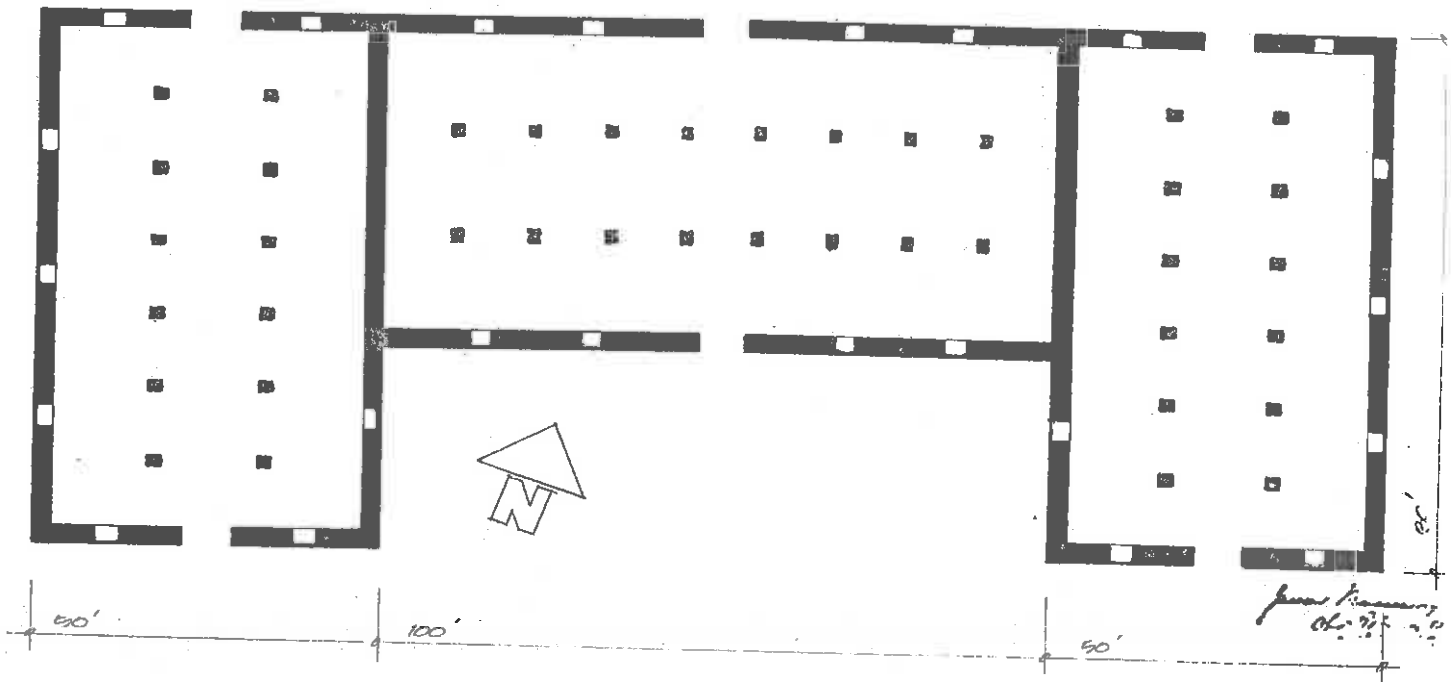
CONVICT ESTABLISHMENT FREMANTLE W.A.

COMMISSARIAT STORE

SECTION



GROUND PLAN



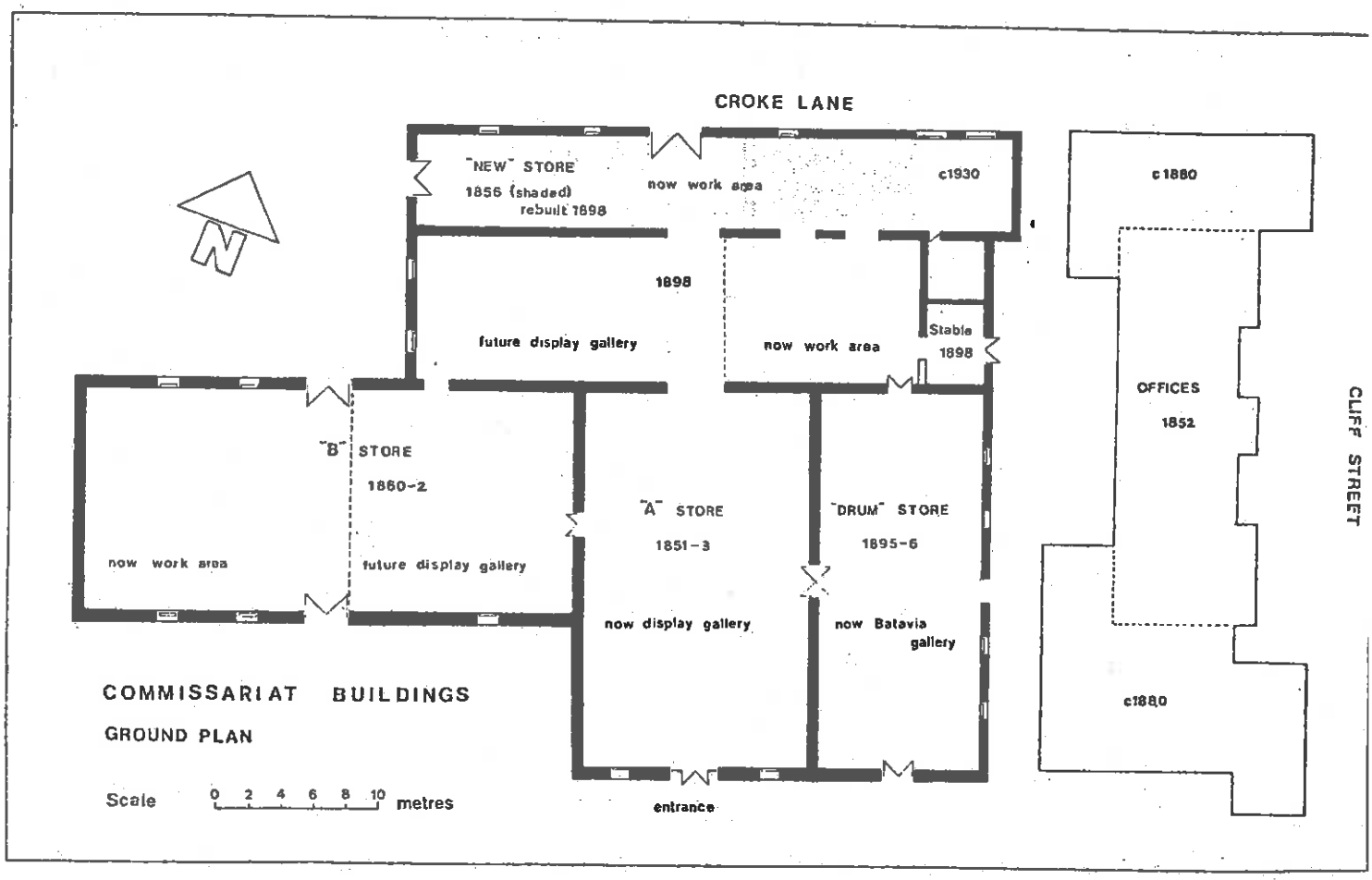
P.W.D. Plan 79 (1 & 3) in Battye Library.

so the building was filled with stores before the roof was in place.

In 1858 the number of convicts coming to Western Australia again increased. In March 1860 the second wing of the original commissariat was reported as having been carried up to two-thirds of the first storey. The commencement of this large store may have reflected some optimism about the economic state of the colony and the continued presence of the convicts. But in 1861 and 1862 the future of the convict system was in doubt. Progress on the Commissariat was slow. Shortage of skilled labour was once again a problem. In March 1861 the Comptroller-General reported that work on the store was "the only work of any importance which it has been possible to execute". It was not until January 1862 that the store was complete, "except the Fan light over the Doors".

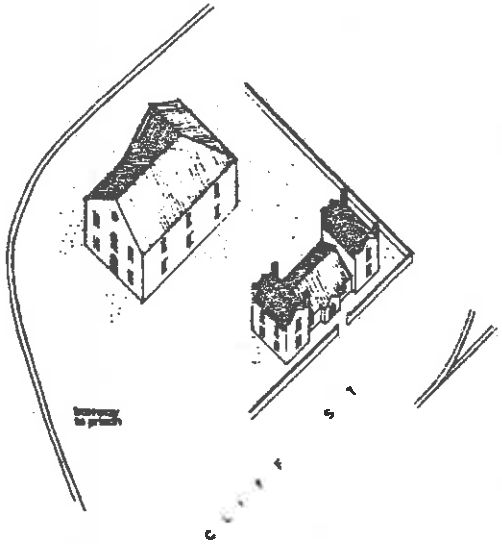
After transportation ended in 1868, the Convict Establishment's use of the Commissariat decreased. By 1878 the Imperial Government had handed the Commissariat buildings over to the Colonial Government. In 1879 the buildings were converted into a Customs House and Bonded Warehouses and put under the control of the Customs Department. In addition, between 1879 and 1890 when the new facilities on the opposite side of Cliff Street were opened, the front Offices of the Commissariat were used as the Post and Telegraph Office, and at least some of the additions to the front building relate to that function.

In the 1890's, the Gold Rush brought with it an enormous increase in shipping to Fremantle. With greater demands than ever before for storage space to house the wealth of goods coming into the State, new sections were built onto the Commissariat (by then generally known as the Government Stores). The wing adjacent to Croke Lane was built in 1898. It replaced and perhaps incorporated

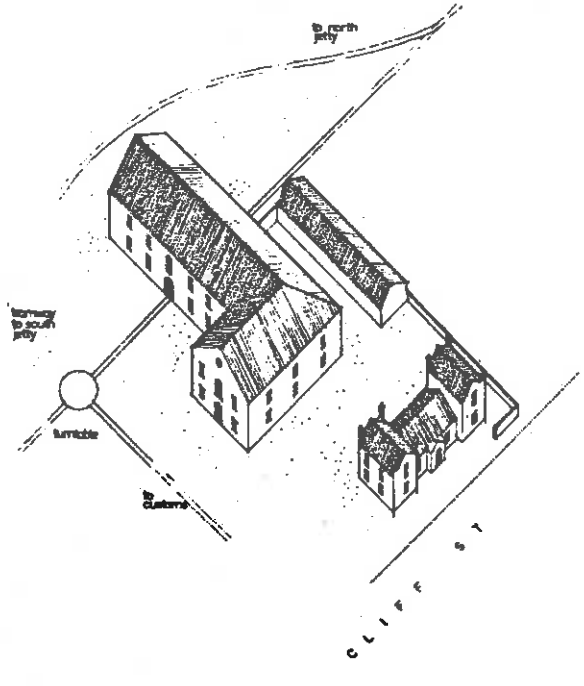


Cover shows Offices of the Commissariat probably late in the 1870's before additions associated with their use as a Post Office.
The photograph is from Nixon & Merrilees 100 Glimpses of Western Australia Fremantle, 1897.

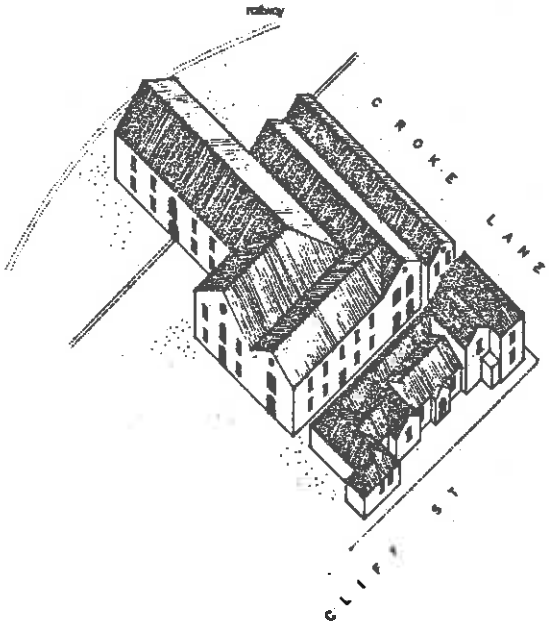
1852



1862



1900



Job No. 26/6/1 Dwg. No. SK1

parts of, the 1856 "New Store". Plans of 1895-6 show the wing which is now the Batavia Gallery (then the "Drum" or "Spirit" Store) proposed as a single storey building, but it is possible the second storey was added at the same time. It had certainly been built up to its present form before 1923.

These buildings were used by several Departments and for many purposes until, in 1977, Government Stores Department vacated the Commissariat and conversion of the building to form the new Maritime Museum commenced.

Externally this building complex is very plain but inside, its limestone columns, brick arches, high galleries and air of vastness create an almost castle-like atmosphere. It is significant both architecturally and because of its associations with the early growth of the State.

In the days before the construction of Fremantle Harbour, the route along Cliff Street past the Commissariat Building was indeed the "Western Gateway" to Australia.

The upstairs windows of the building look over the waters of Cockburn Sound to Garden Island where the Swan River Colony's first settlers were put ashore in the winter of 1829.

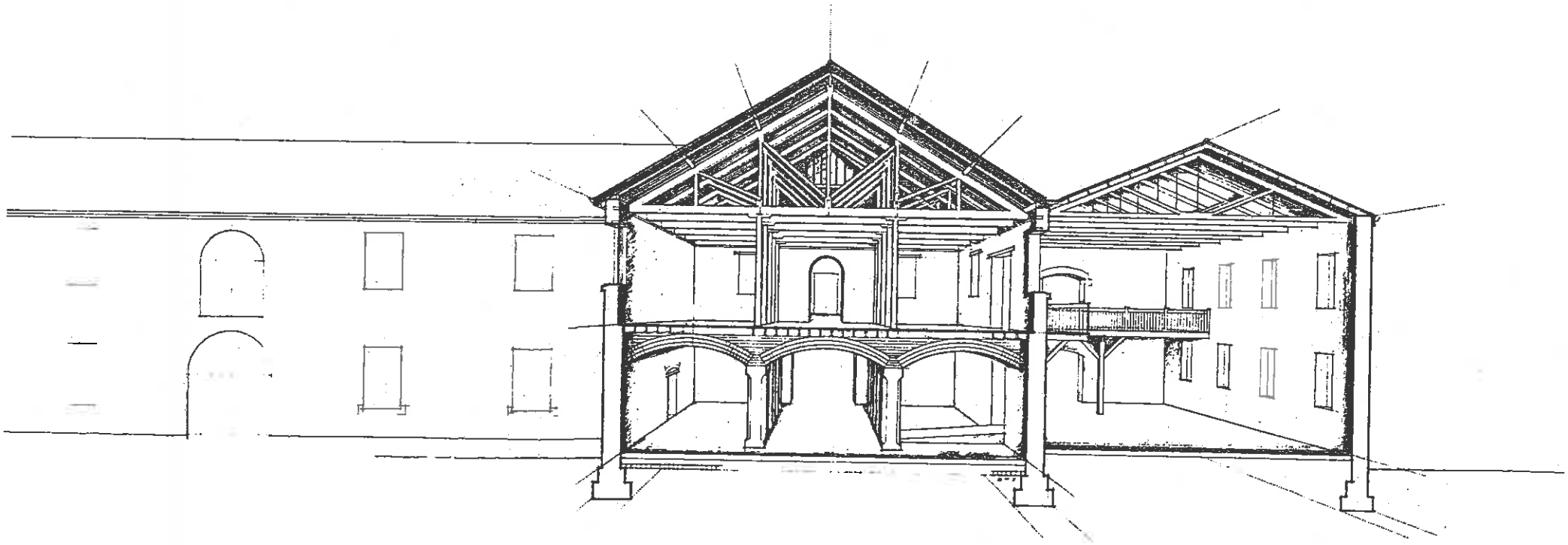
Converting the building to a museum has been a challenge to architects, engineers and museum staff.

The building itself is as historically interesting as most of the material displayed in it. In renovating and converting it, great care has been taken not to destroy the original atmosphere of space and simplicity. Walls have been left bare and the emphasis is on the display of larger objects that are either free-standing or on open platforms with simple handrails, rather than in elaborate showcases.

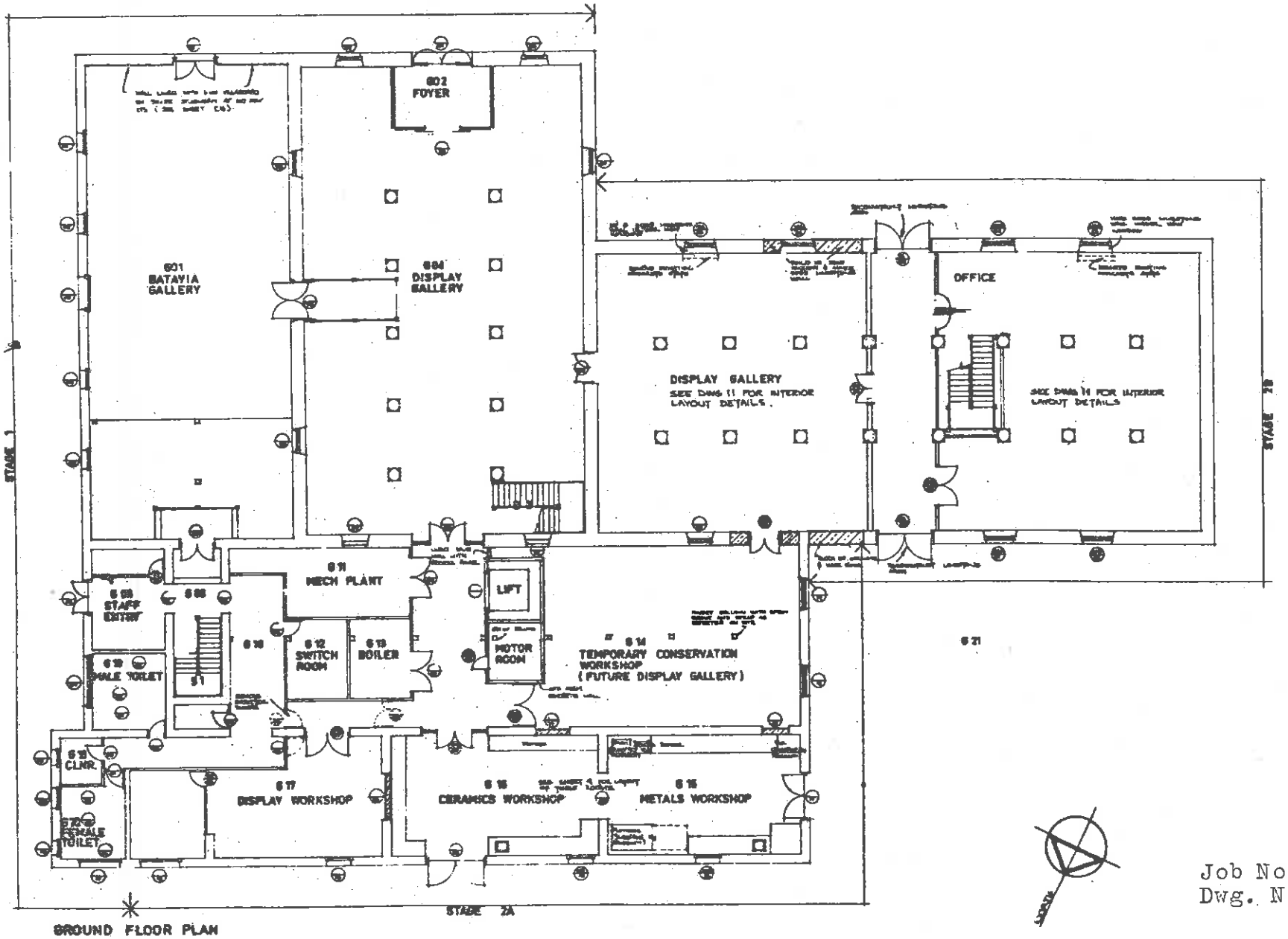
Alterations necessary to fit the building for its new role have, wherever possible, been confined to newer sections such as the 'Batavia' Gallery which was built in 1895-96. Older sections have been preserved in much of their original form, although still incorporating some of the changes through the years that help reflect the history of the building.

The work is being executed by the Departments Day Labour Organisation and involves both the resurrection of skills not normally encountered and the use of new techniques for the preservation and reconstruction of stonework and timber elements.

Because of its age and deterioration, the Commissariat Building posed a number of engineering problems described briefly later in the text. Solutions were found which were, it is believed, practical, safe and economic as well as being acceptable historically, architecturally, while providing a practical, functional building for the Western Australian Museum.

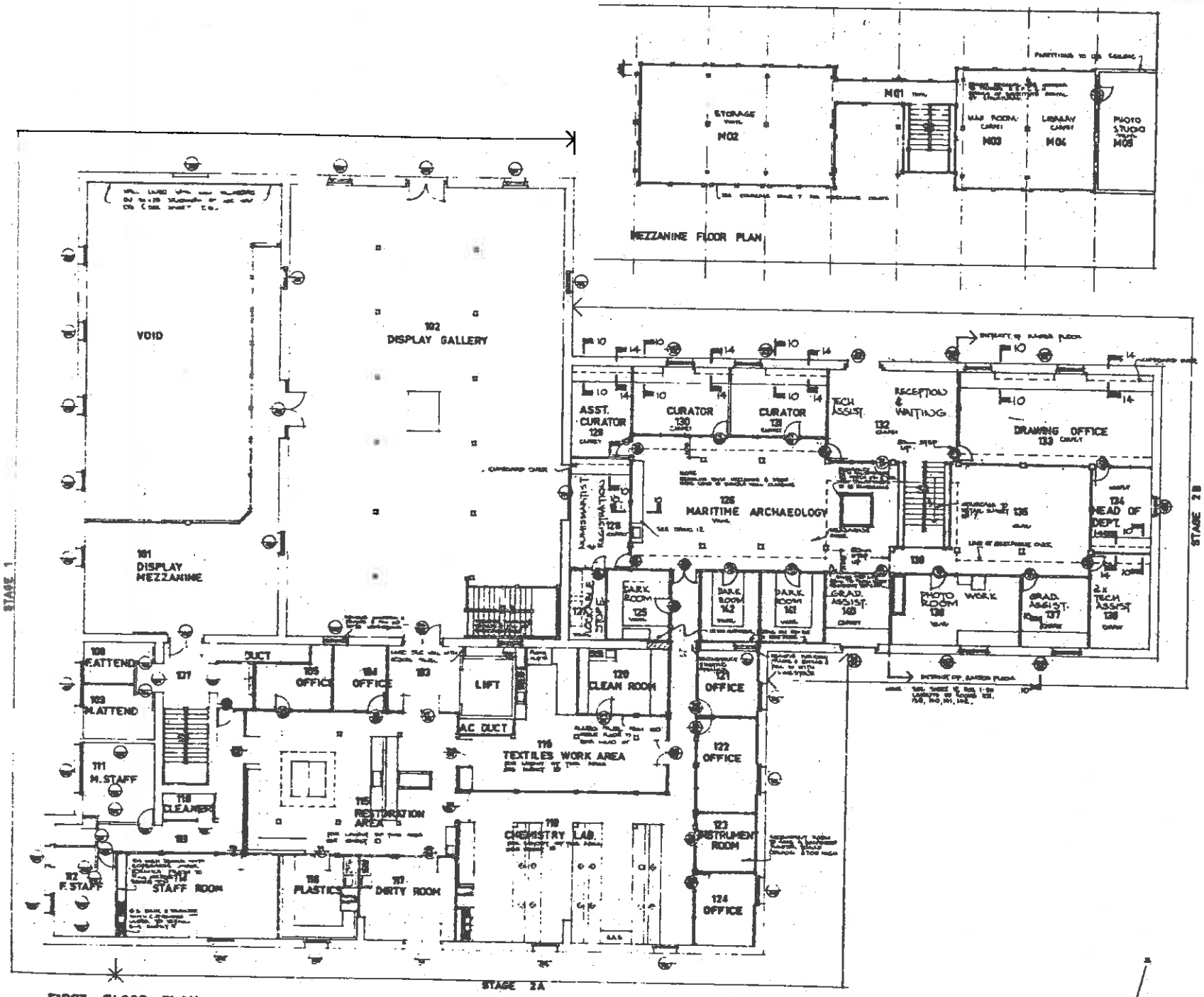


Job No. 26/6/1 Dwg. No. SK2



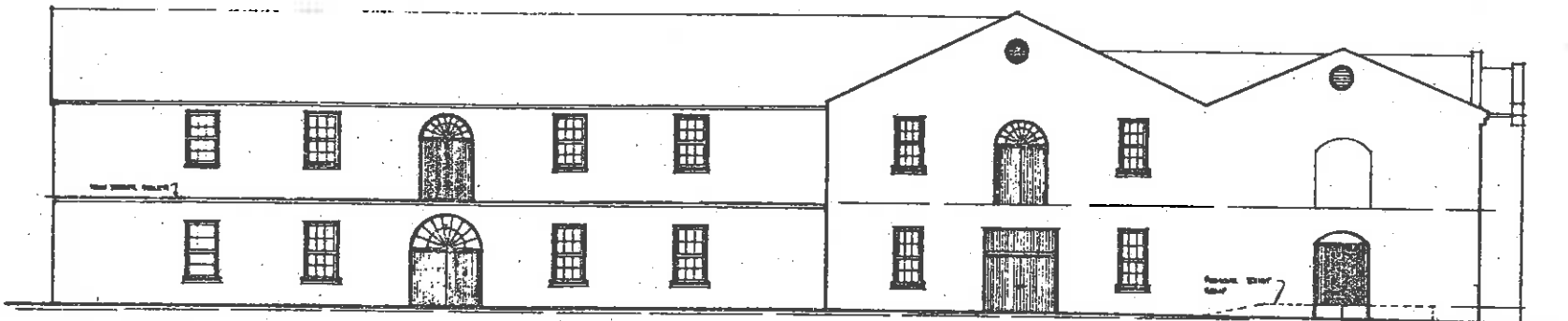
GROUND FLOOR PLAN

Job No. 26/6/3
Dwg. No. 2

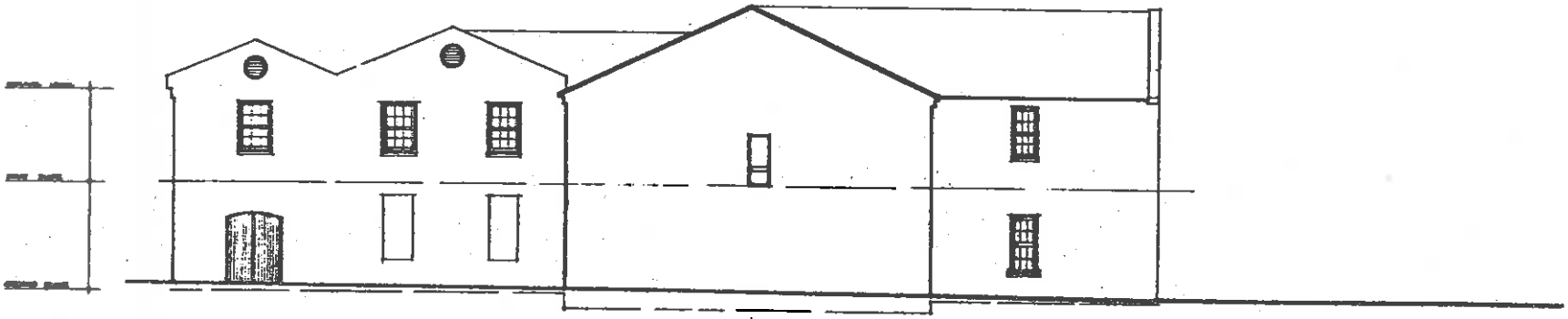


FIRST FLOOR PLAN

Job No. 26/6/3
Dwg. No. 3

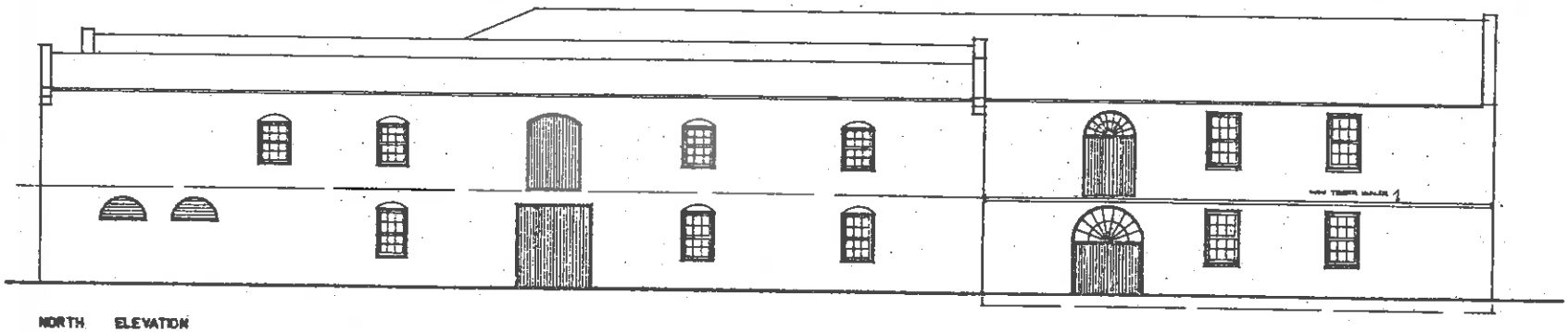


SOUTH ELEVATION

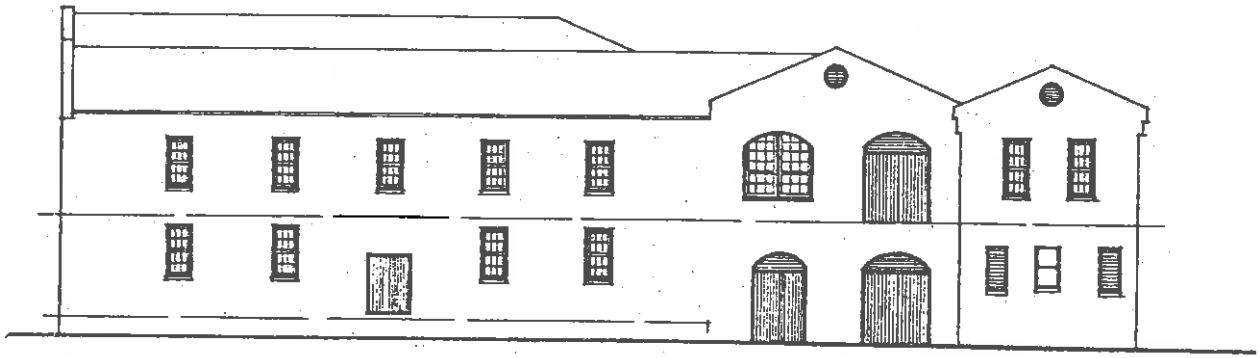


WEST ELEVATION
scale 1:100

Job No. 26/6/3 Dwg. No. 4



NORTH ELEVATION



EAST ELEVATION

Job No. 26/6/3 Dwg. No. 5

WESTERN AUSTRALIAN MARITIME MUSEUM

The new Western Australian Maritime Museum in the Commissariat Building, Cliff Street, Fremantle, fills a long-felt need for a major maritime museum in Western Australia.

The museum complex comprises 4 stages.

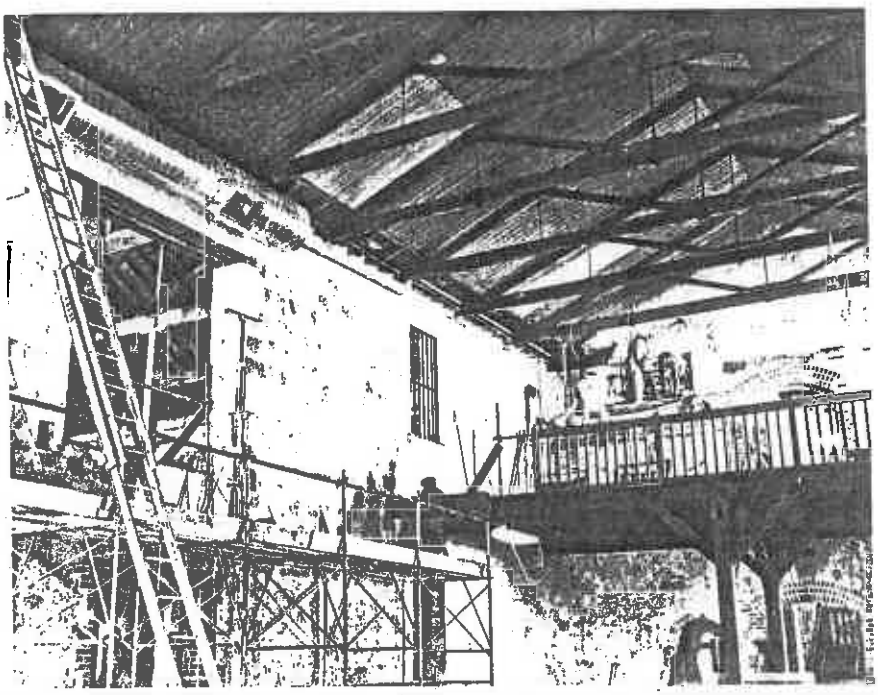
Stage 1	:	Display and Batavia Galleries and public amenities.
Stage 2A	:	Accommodation for Conservation Department.
Stage 2B	:	Accommodation for Maritime Archeology Department.
Stage 3	:	Administration and Education Facilities.

The first stage was opened in September 1979 to form part of the State's 150th Anniversary Celebrations. The new building is approximately four times as large as the existing Fremantle Museum.

One of the main features of the new Museum will be the reconstruction with the original, salvaged timbers of the stern section (one third of the hull) of the Dutch East Indiaman 'Batavia', which was wrecked on the Abrolhos Islands in 1629.

The Batavia timbers have been stabilised by soaking in a saturated solution of water - soluble wax or polyethylene - glycol so that they become completely impregnated with preservative. Drying too quickly would cause the timbers to crack, so temporary humidification chambers were erected in which the humidity was lowered from 99% to approximately 65% - the humidity of the Batavia Gallery. Since the quantity of timbers exceed the capacity of the humidification chambers the process is carried out in batches; each

Removal of first floor section for
Batavia Gallery.



Removal of floor section complete.

batch taking approximately 1 year, after which the timbers are stacked in open shelves as an interim display in the Batavia Gallery. The first batch of timbers has already been treated but the entire process will take about 4 years, in which time a steel frame is to be designed to support the reconstruction.

The re-erected stern section of the Batavia will occupy a space approximately 6m wide, 6m high and 10m long in a large airconditioned Gallery.

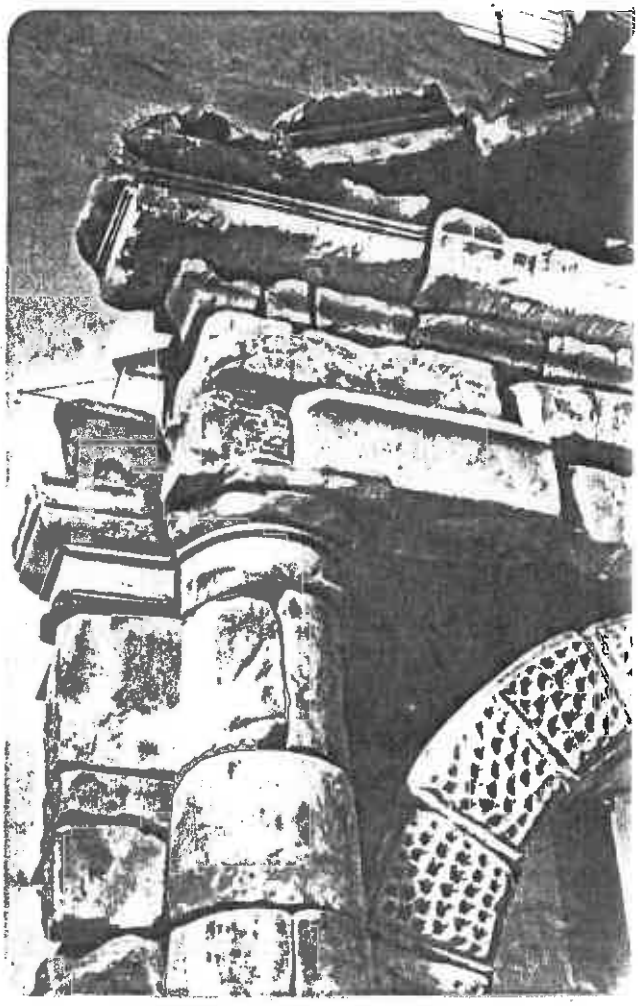
Access onto the deck of the fully rigged stern section (complete with cannon) is to be from a mezzanine floor. To form the void for the Batavia, most of the original first floor of a store room of the Commissariat Building was removed. This floor formerly supported an external limestone wall which, although now unsupported and over eight metres high, was determined to be structurally adequate after repair and restoration. Further strengthening of the wall will be provided by the supports for the Batavia stern.

The Batavia stern section is assymetrical, both in shape and load distribution. Its supporting structure will have to accommodate these factors, allow free access to the hull and be as inconspicuous as possible. Analysis of load distribution and the structural system will be facilitated by use of the scale model of the Batavia currently under construction.

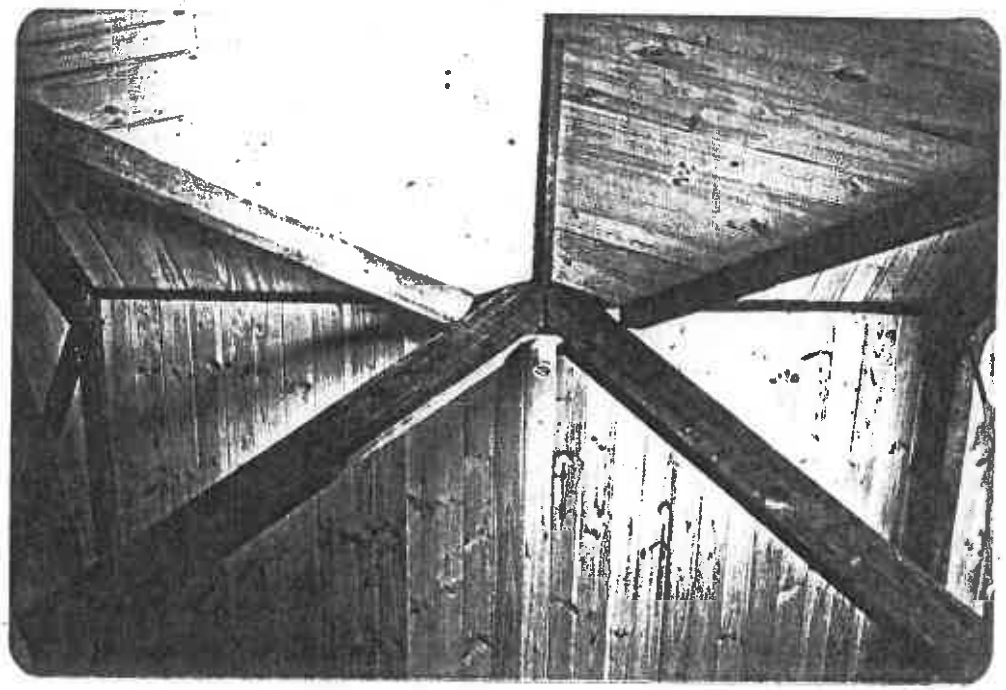
Other notable features of Stage 1 include reconstruction of crumbling brickwork arches supporting the floor over the Lower Display Area, and reconstruction of the stone portico retrieved from the Batavia wreck.

The stone portico was prefabricated in Holland and carried as Ballast to be erected as the entrance portico to Batavia Castle. The ballast portico has been reconstructed on a steel frame with each stone being held in position with chemical anchors.

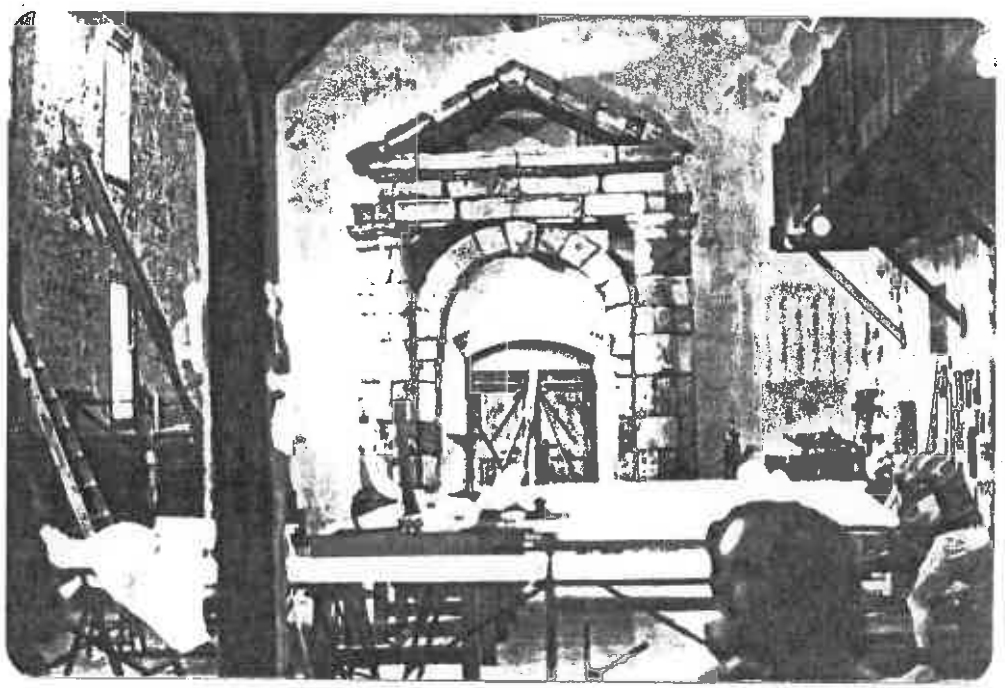
Stone portico in the
Batavia Gallery.



Close up of Portico.



New T & G pine ceiling in Conservation area.



Batavia Gallery temporarily being used as workshop to build a scale model of Batavia.

BUILDING RESTORATION

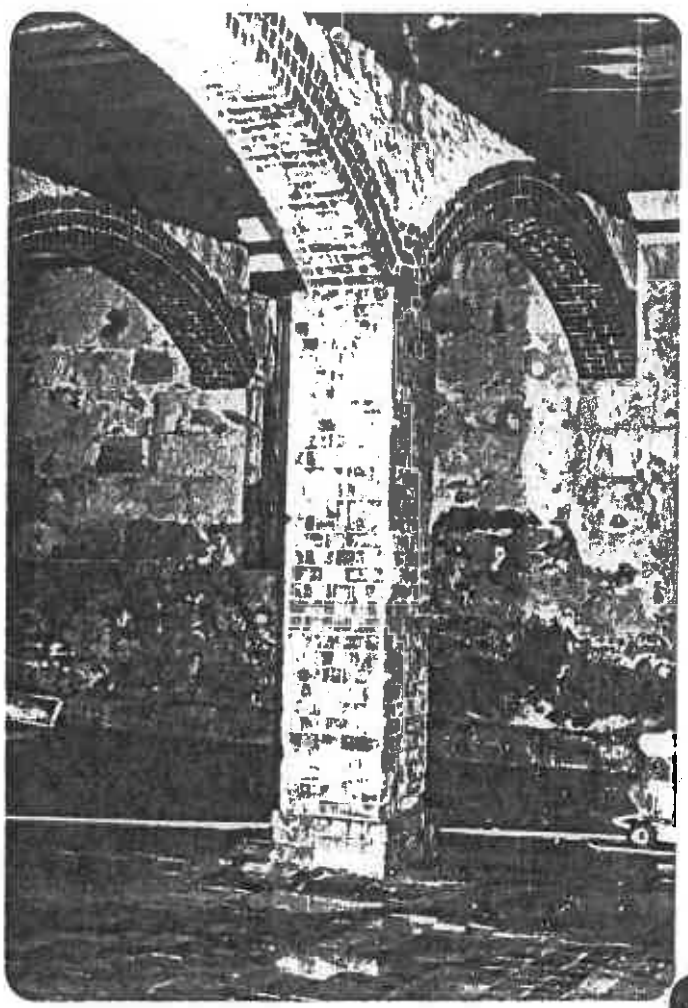
Arch Renovation

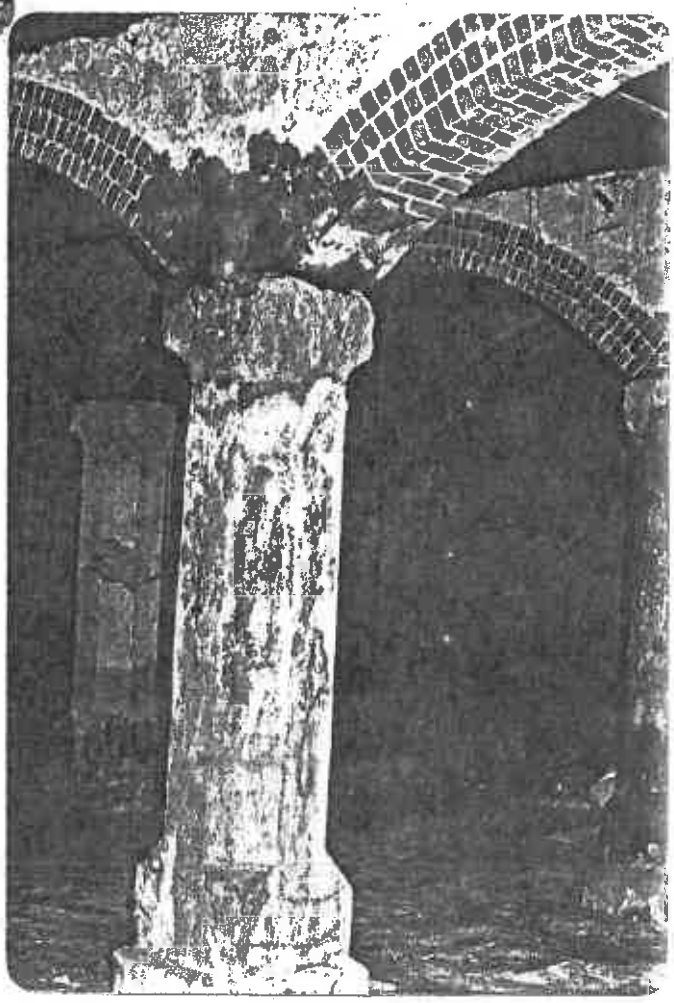
Pressure injection of a mortar coloured epoxy grout was the method used to strengthen the original brickwork arches of the Lower Display Area. Scavenged bricks of the same vintage and appearance complemented that work. Construction of a new arch to mask a previous steelwork extension was so well executed in scavenged bricks and concrete that the layman could not differentiate between the old and new arches. Matching new bricks have also been successfully used in the restoration work.

Limestone Renovation; this was perhaps the most time consuming, painstaking activity of the renovation programme. Some of the stonework was in extremely poor condition, to the extent that daylight was visible through the walls. The deterioration was caused by the building's exposed situation and the high water table. In winter the water would rise and in summer fall, leaving salt deposits in the wall which break down the limestone structure. The walls were first cleaned, either by hydroblasting or chipping and scrubbing. Stone blocks were replaced as necessary. The footings were treated with Raffles "Goliath" masonry water repellant with 7.2% silicone resin in white spirit gravity fed into 45° holes, 150mm above ground level at 300 centres. The walls were also sprayed externally with a silicone resin solution.

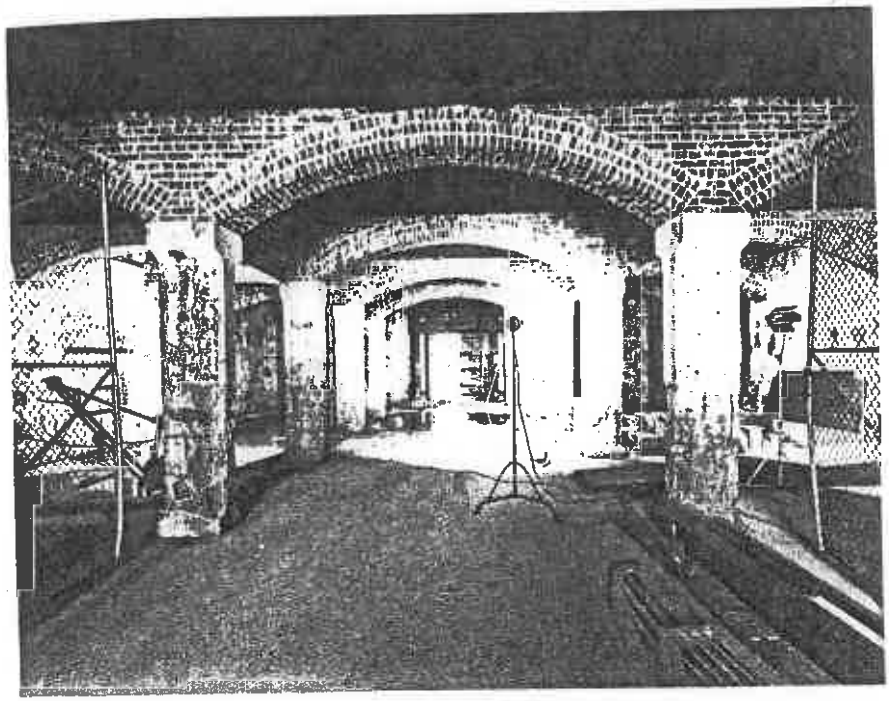
Floor Renovation; To achieve a level ground floor, a brown pigmented concrete topping of 75mm maximum thickness was applied to the existing concrete slab in the Display Gallery.

Timber First Floor renovation; The butt jointed timber first floor was rough and uneven to the point of

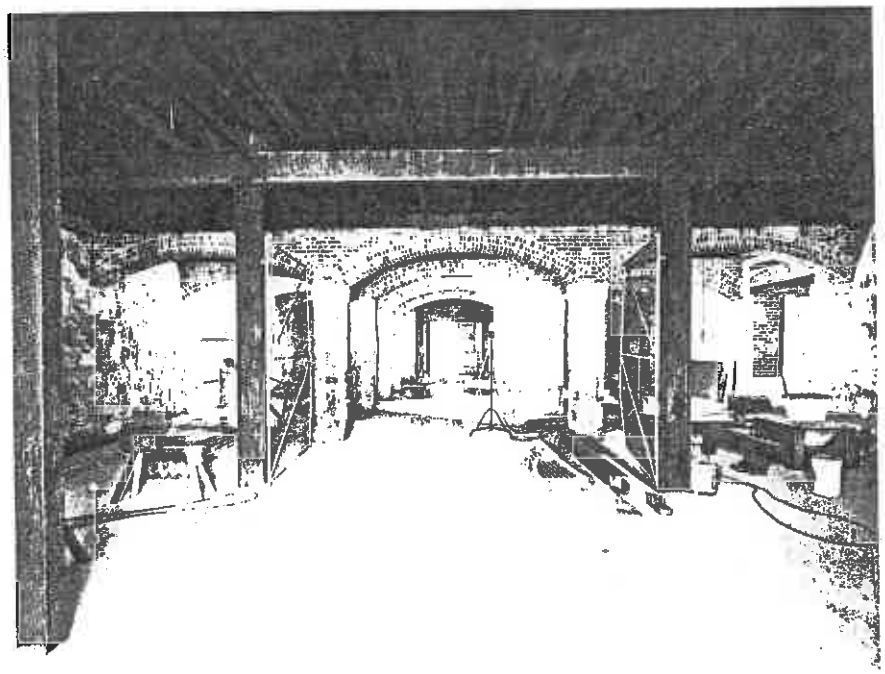




Conditions of brick and limestone columns before renovation.



Limestone Columns and brick arches in the Display Gallery before renovation.



Steel column and beam replacing existing limestone columns and brick arch.

being dangerous. To alleviate the problem some boards were chocked up, others reversed and in some small areas the boards were replaced. The whole of the floor was then lightly sanded and given 2 coats of Peerless penetrating seal. The inextricable, rusted, handmade nails made the work very tedious and slow.

Ceiling Renovation; The underside of purlins were lined where required to match existing with T & G pine boards, and mineral fibre insulation was installed above the ceiling.

Renovation of Roof: Replacement of all damaged corrugated asbestos sheets and p.g.i. gutters was carried out. All existing roof lights were removed and voids sheeted over with the asbestos roofing.

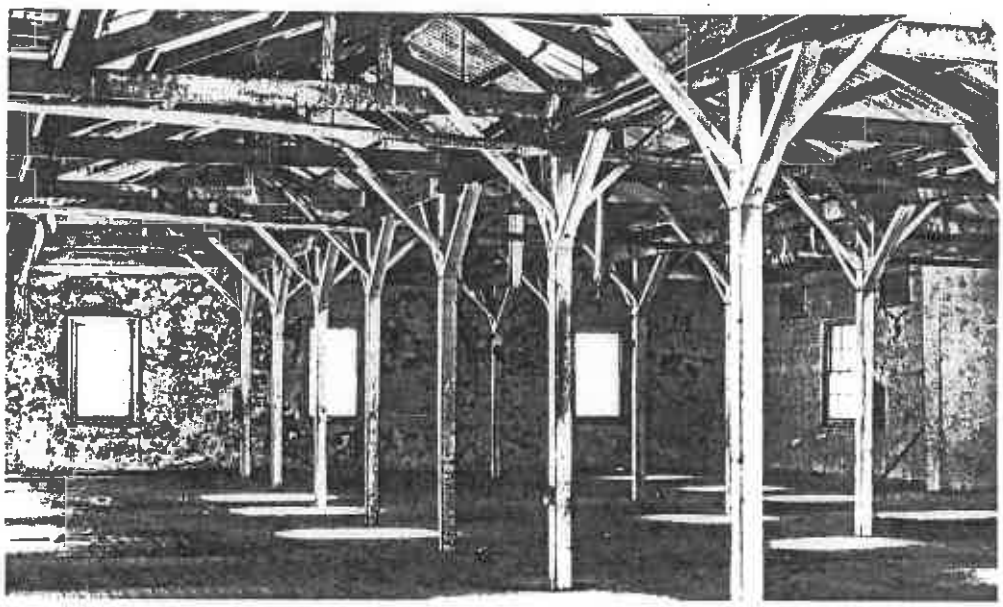
As the existing establishment did not have stormwater drainage, a completely new disposal system has been installed.

Stormwater ingress had caused considerable damage to the internal stone walls and columns, concrete and wood block ground floor surfaces.

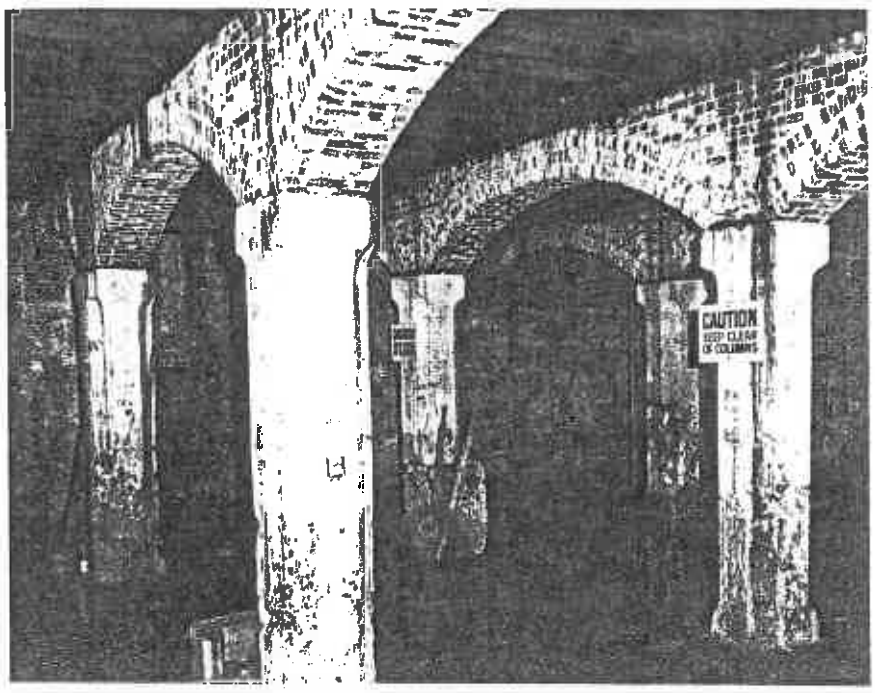
Renovation of doors and windows; Repairs or replacements to match existing types were carried out. All door furniture was replaced with new brass knob types to suit the building period.

All metal grilles have been removed from the limestone walls where they had caused considerable cracking, through the corrosion of the metal built into the stone. Grilles have each been framed in an independent wrought iron surround which is masonry anchored to the limestone reveals.

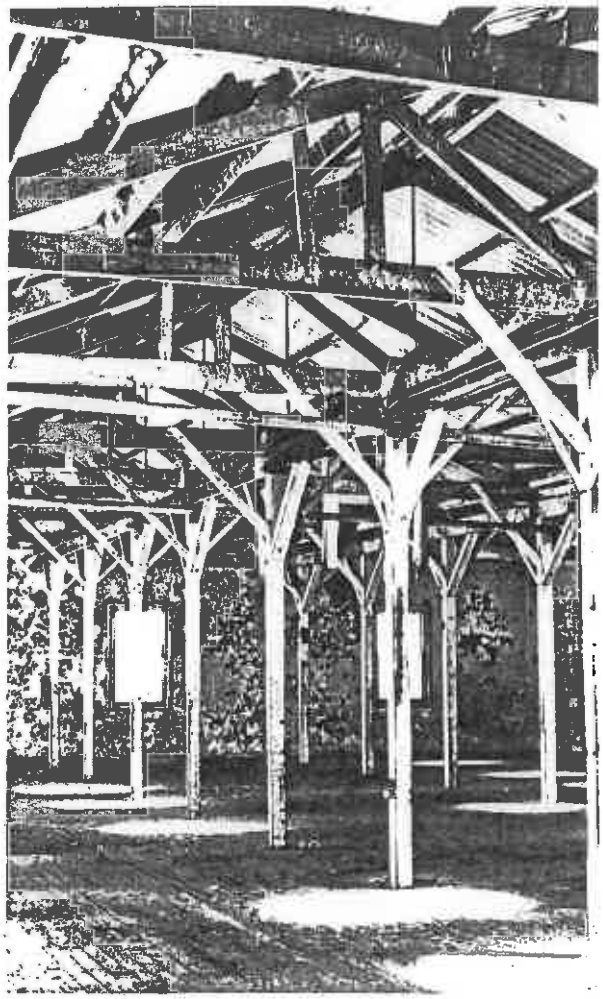
New facilities include toilets, staircases (previous vertical circulation was via 80^{o} stairs) and a lift to enable circulation by the disabled in addition to other requirements.



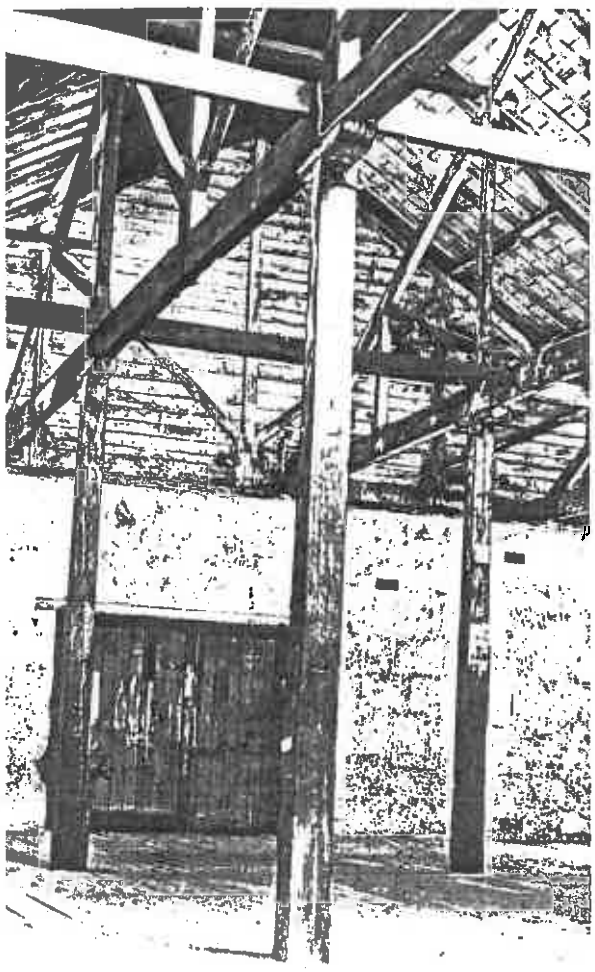
North wing first floor before renovation.



Interior of the 1st Stage of the Commissariat before restoration.



1st floor north and "B"
store before restoration.



STAGE 2A

Conservation Section of Western Australian Museum

The purpose of the Conservation Section is to analyse archeological relics (or any other items of interest to the museum) and to recommend and carry out preservation treatments. The work for example is closely allied to the Batavia reconstruction. This Department also utilised the Section's expertise to analyse parts of the building which had deteriorated and recommend treatment.

Accommodation was required for laboratory space, offices and workshops with special facilities for ceramics, metals, textiles and plastics.

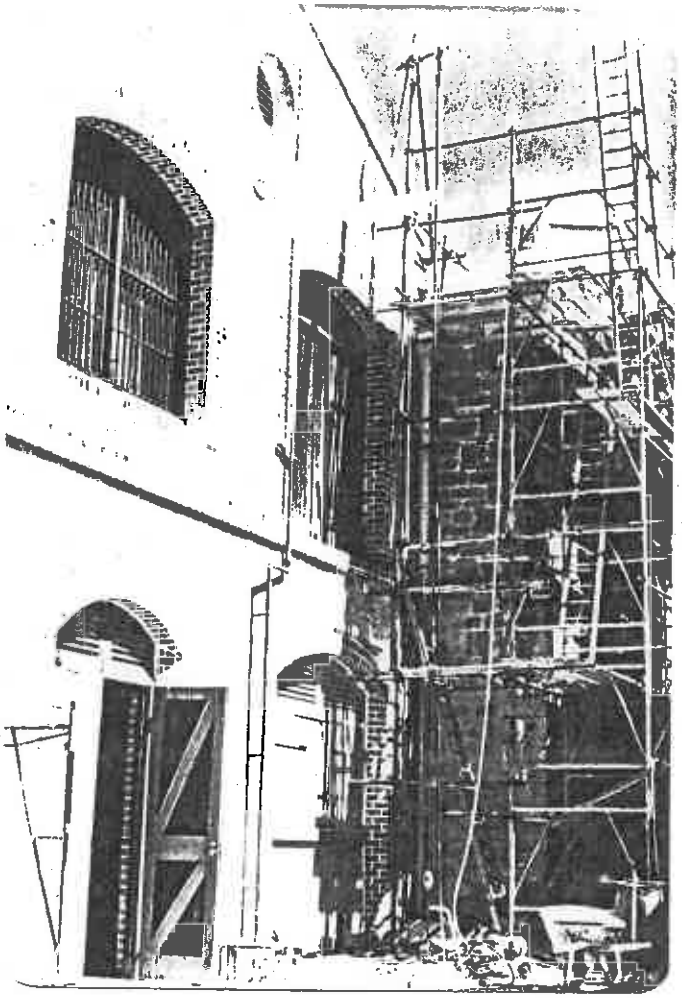
Finishes and Fittings; The flooring in the conservation section was too rough for satisfactory laboratory flooring. The existing floor was covered with compressed asbestos sheet on synthetic latex. Sheet vinyl flooring was then laid on the asbestos.

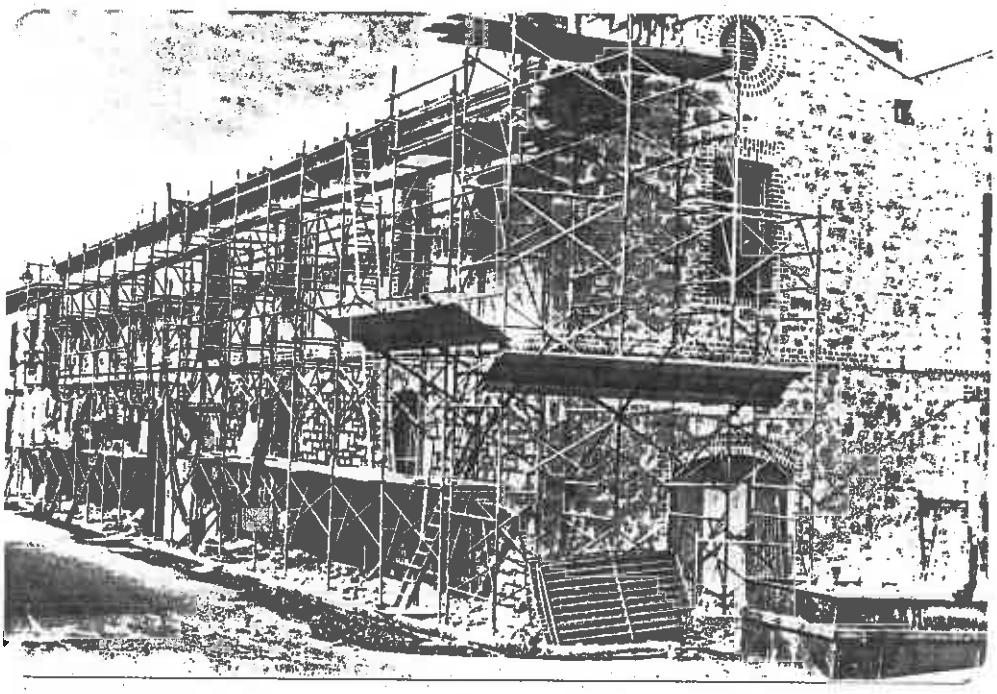
Internal partitions were steel stud faced each side with plasterboard and painted sympathetically with the limestone walls.

The wall and ceiling finishes were the same as those in Stage 1. The main structural concern was the heavy loads imposed on the existing statically indeterminate 'trusses'. Some of the tie members were strengthened. The footing treatment was varied in Stage 2A. The material injected was Drisil 48. The solids content was raised to 12% and injection hole spacing reduced to 200mm. A second line of holes at 200mm centres was drilled 150mm above the first and at alternate spacings.

'Clean' areas were sprayed internally with clear PVA.

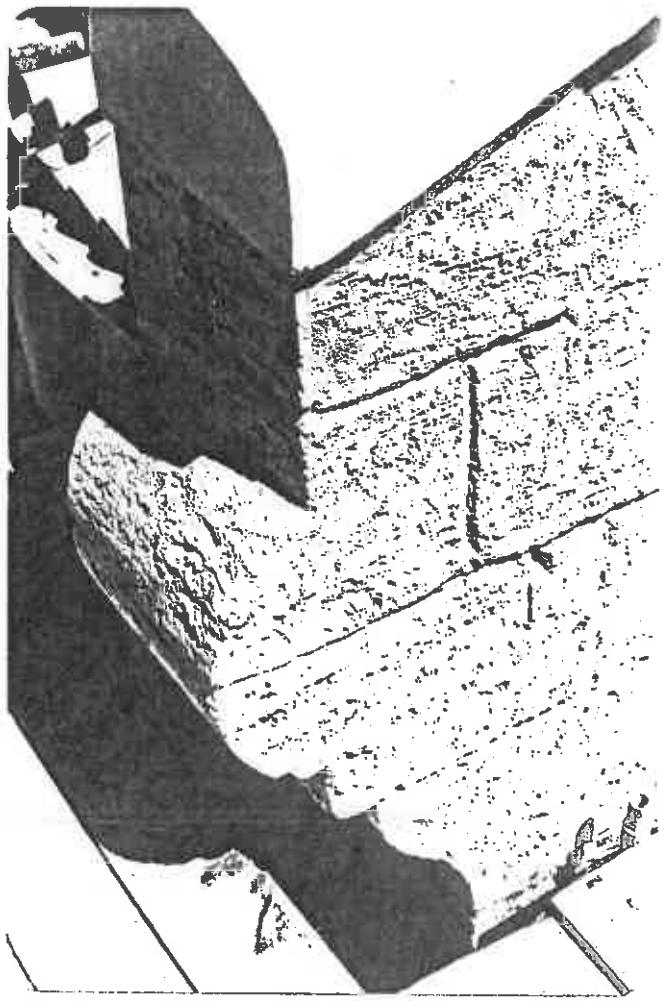
Restoration of East wall.



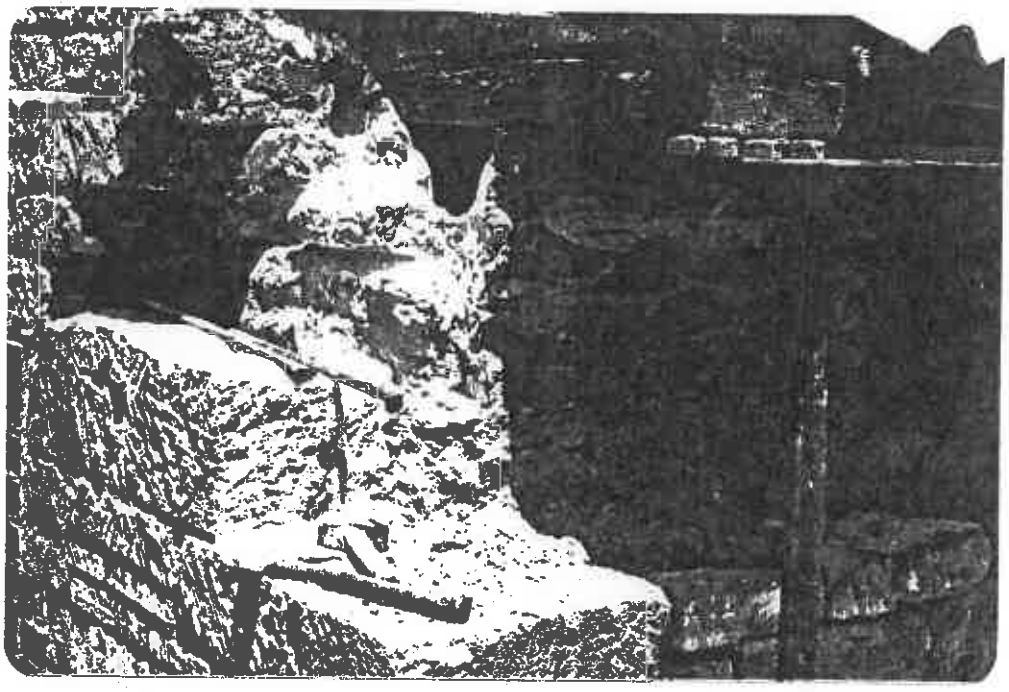


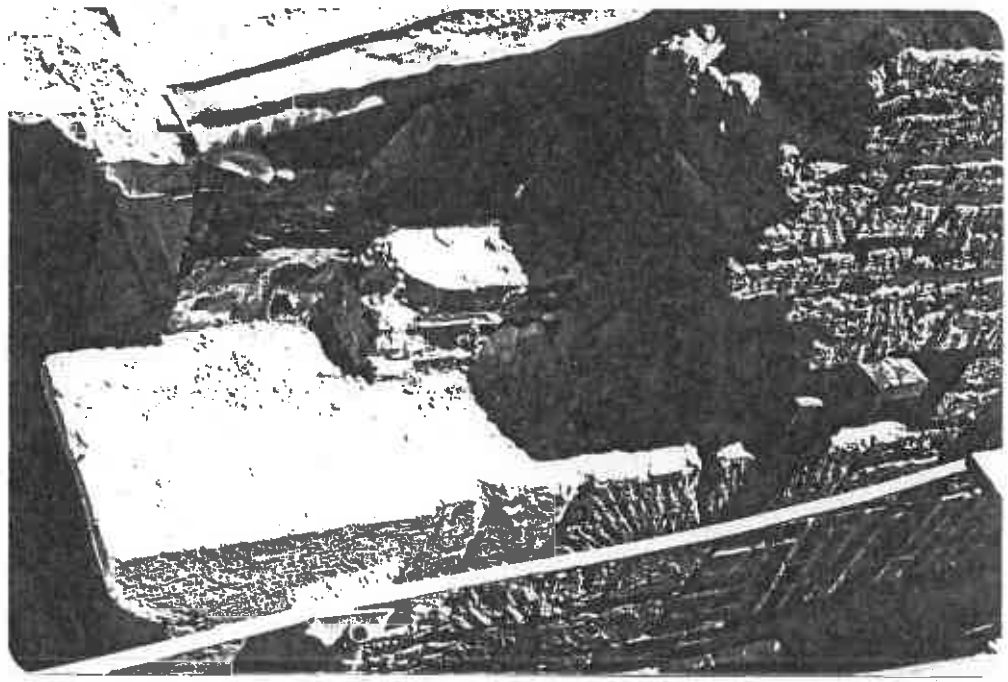
Restoration of North Wall.

Restoration of external limestone walls by chipping and brushing - later abandoned in favour of hydrocleaning.



New stone corbel completed.



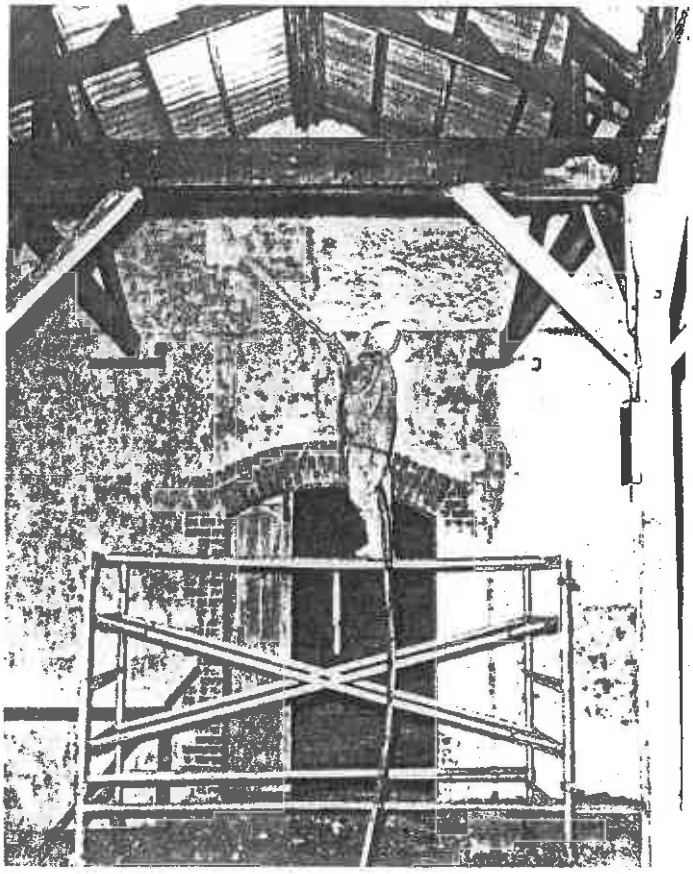


Corbel re-construction.

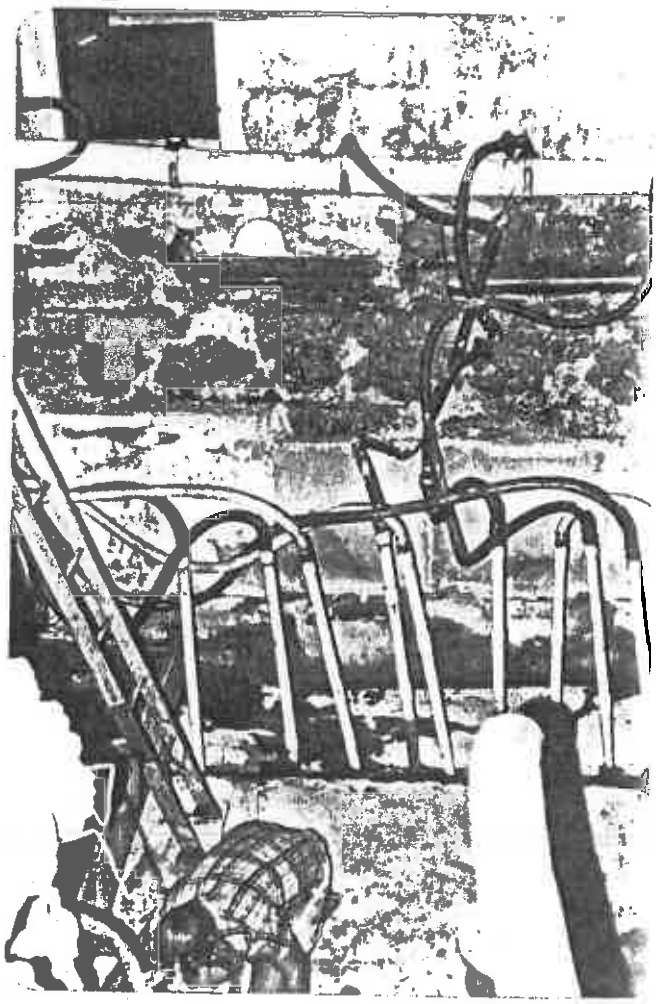
The lift shaft and lift mentioned earlier have now been installed. Dewatering of the lift shaft overrun excavation and underpinning of an adjacent limestone wall were the main structural problems. Cramped conditions made placement of dewatering and excavation equipment an interesting exercise, especially when dewatering problems necessitated a second ring of spears, manifold and pump. Dewatering was difficult because a layer of compressed seaweed below the footing level but above the bottom level of the lift shaft allowed water from the nearby Indian Ocean to flood in at a rate the original system could not handle. The second ring of spears was placed at a higher level and both sets successfully depressed the water table to allow excavation by hand and conveyor belt. The wall was underpinned by using a variation on a conventional method - holes were dug in a hit and miss pattern and infilled with super plasticised concrete.

Stage 2A also includes a new open courtyard conversion of the old dilapidated lean-to corrugated iron outbuilding. The courtyard, which is to be used by the Conservation Section, will accommodate the chemical and flammable materials stores which are located off the western wall under a new roof below the parapet of the new stone wall surrounding the courtyard.

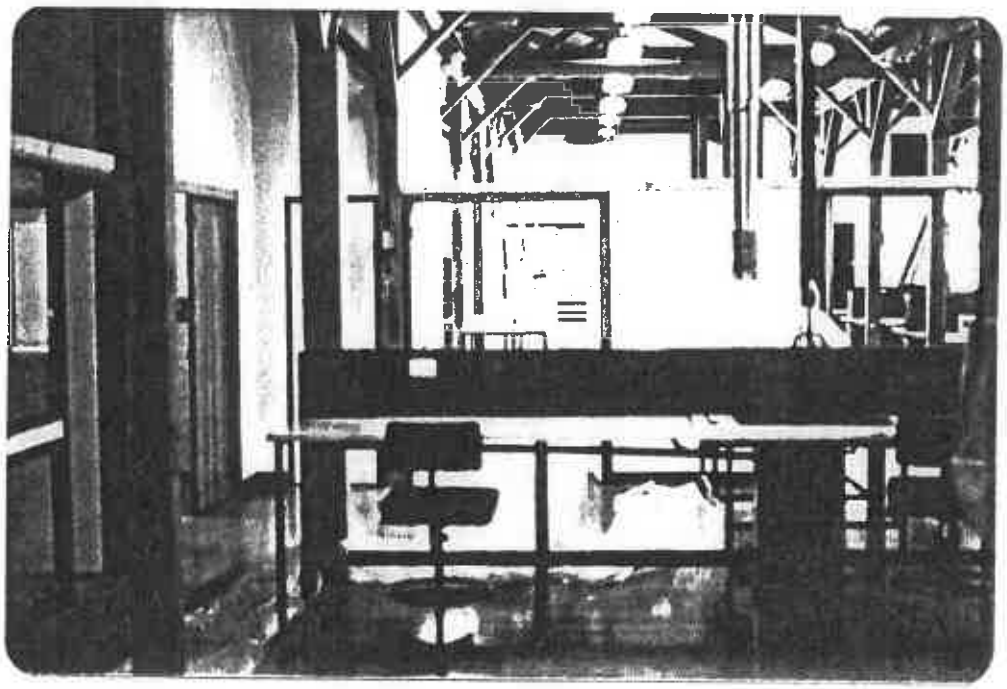
The above works for Stages 1 and 2A have now been completed.



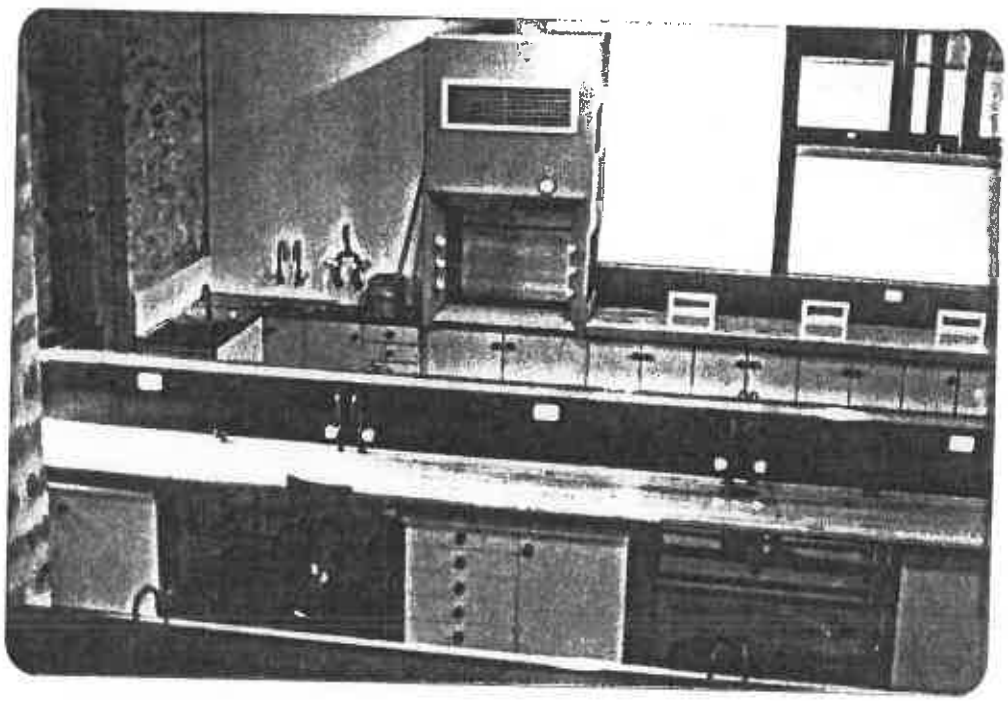
Hydrocleaning of internal limestone walls.



Dewatering and under pinning in lift shaft.



New office and laboratory area in Conservation Section.



New laboratory in Conservation Section.

STAGE 2B

Maritime Archaeology Section of W.A. Museum

This section is involved in charting history through an exploration of wrecksites. The work includes diving on wrecks, the physical reconstruction of artifacts and the researching of their social/ historical context.

Requirements were for storage of expedition equipment, office and drafting spaces, storage for collection, darkroom, photo studio and library facilities. Additional storage space has been created at the upper level by utilizing the space immediately below the steeply pitched roof. A mezzanine floor will be constructed at the level of the bottom chord of the roof 'trusses'. To facilitate access, a diagonal web member will be removed from several 'trusses', after strengthening.

The existing ceiling of weatherboards laid directly on the rafters is to be retained. Insulation is to be achieved by the injection of urea formaldehyde foam between the roof sheeting and boarding.

Wall and upper floor treatments will be the same as for stage 2A. All timber columns are to be epoxy grouted.

Considerable reconstruction was necessary on the ground floor, half of which will become display space and half workshop space. As mentioned earlier, a problem experienced throughout the building is the migration of salts from the ground water up through the porous limestone walls and columns. Some footings in Stage 1 were injection grouted with silicone to stop migration, but this method showed only limited success and is still under evaluation.

To facilitate the removal and reconstruction of the existing columns at ground floor level it was decided to prop the roof trusses, first floor and brick arches to remove the load from the columns.

A freyssinet jack between new steel columns and their new footings will be used to jack the columns against the arches to take up the load before the props are removed. Formwork used for the new concrete columns in Stage 1 will be re-used to clad the steel columns with cobcrete which, when painted, closely resembles the original rendered limestone.

A similar procedure will be used to replace some brick piers in the proposed workshop area. This brickwork likewise cannot be prevented from deteriorating as a result of salt infusion. The brick piers to be replaced were themselves a replacement for the original limestone columns. Also these piers will carry a greater load than the others because of sound proofing of the floor above the workshops. Sound proofing will be achieved by erection of a double layer false ceiling and 50m of dry sand, sandwiched between the existing floor and a new floor.

The jarrah block floor will also be rebuilt. The existing 155mm x 155mm jarrah blocks were rotting, many were damaged by vehicular traffic and some sections had been replaced ad hoc with concrete, leaving a patchwork of irregular concrete infill, sections of damaged blocks, sand and some fairly good sections.

From the entire ground floor enough sound blocks were salvaged to relay on the half to be used as display gallery.

The rotted section of each block was cut off all blocks to a uniform 60mm thick. These blocks are presently stored under plastic to prevent drying and cracking. As the work proceeds they will be treated

with tributyl tin oxide fungiside and relaid on synthetic latex on a concrete slab. Manganese based wood filler is specified for the joints. The whole of the floor will then be lightly sanded and given 2 coats of 'Peerless' penetrating seal.

Because of the high water table the new concrete slabs on the ground cause concentration of moisture upward pressure. If the slabs were to extend to the wall the problem of rising damp in the limestone would be exascerbated. To moderate this effect a 'breathing space' of 310mm is to be left between the slab and the wall. This gap will then be filled with 2 rows of jarrah blocks on a gravel base.

Stage 2B also includes a new open courtyard which is similar in design and construction to that for Stage 2A. This courtyard will be used by the Maritime Archaeology section and will accommodate their store, workshop and garage.

STAGE 3

Administration

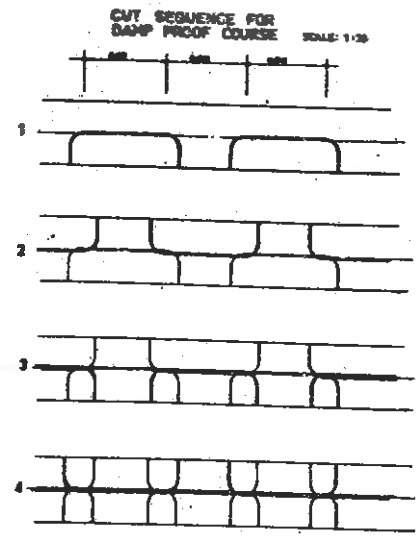
This stage comprises the restoration of the Old Customs Building for use as an education and administrations facility.

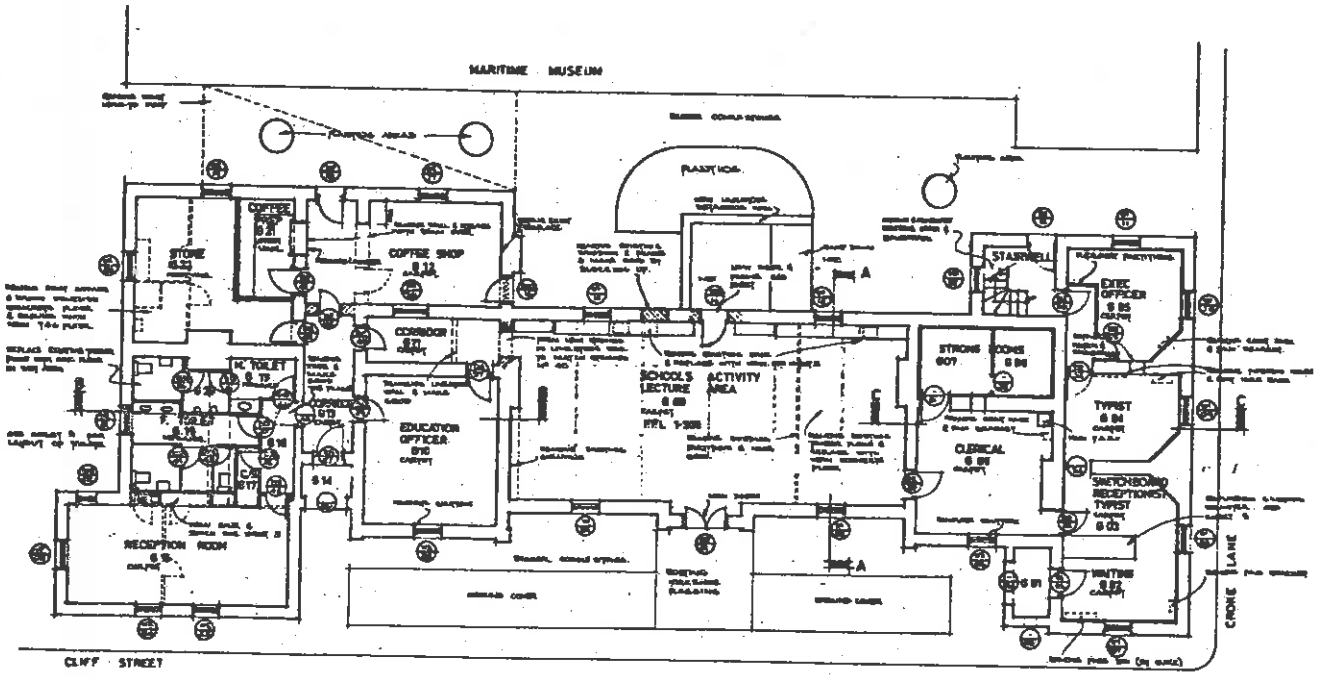
The building is in much better condition than the Commissariat Stores, so that only minimum repairs and renovations will be necessary. Even some old fittings such as a public counter and small document lift are able to be preserved.

An upper floor ceiling is in a dangerous condition and will have to be replaced and a recently (1940) installed asbestos ceiling to the central hall area will be removed to return the space to its former state.

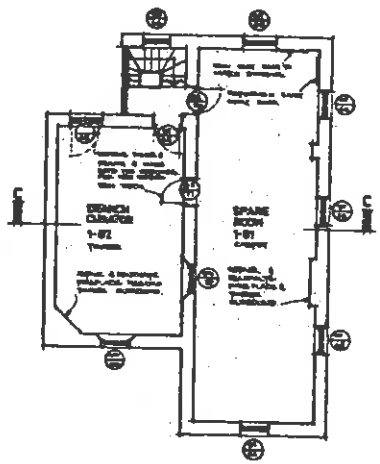
The floor framing members are severely rotted since the bearers sit directly on the ground. The under floor area will be excavated 150mm, bearers and where necessary joists will be replaced. Air circulation around the limestone walls near ground level is critical in controlling the passage of moisture so particular attention has been paid to ensuring adequate ventillation below floor level.

Footing and wall treatments have been specified as for Stage 2B. Quotations will be invited, based on a performance specification for alternative methods of damproofing, including cutting through walls just above ground level and inserting a chemical damp proof course. Quotations will be examined in consultation with the Museum's Conservation Section.





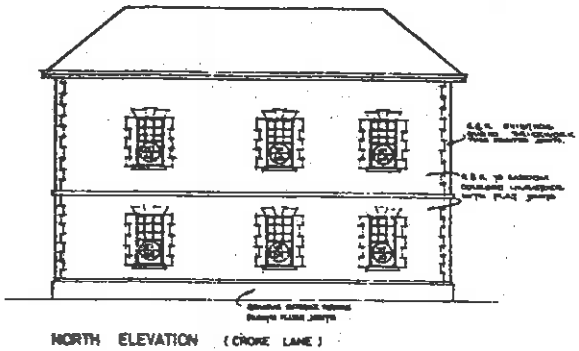
GROUND FLOOR PLAN
SCALE 1:100



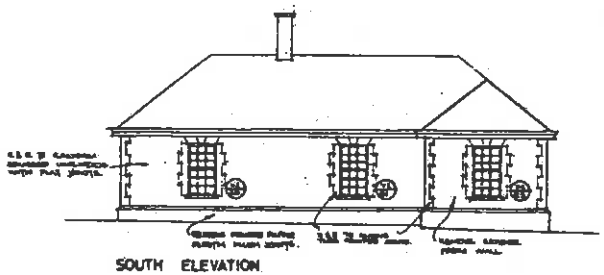
FIRST FLOOR PLAN
SCALE 1:100

4

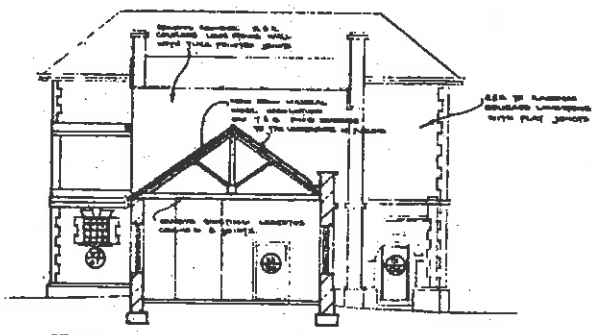
Job No. 26/6/5 Dwg. No. 2



NORTH ELEVATION (CROKE LANE)



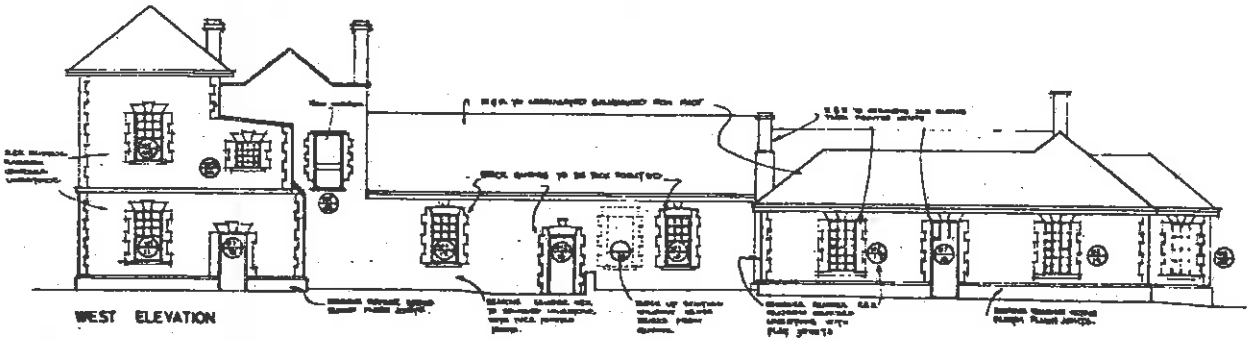
SOUTH ELEVATION



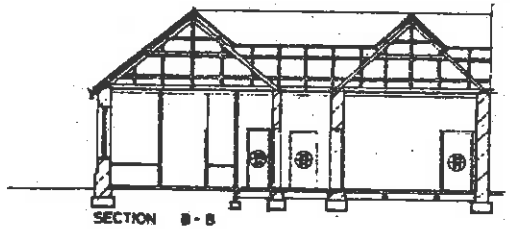
SECTION A-A

LIMESTONE JOINTS N.T.S.

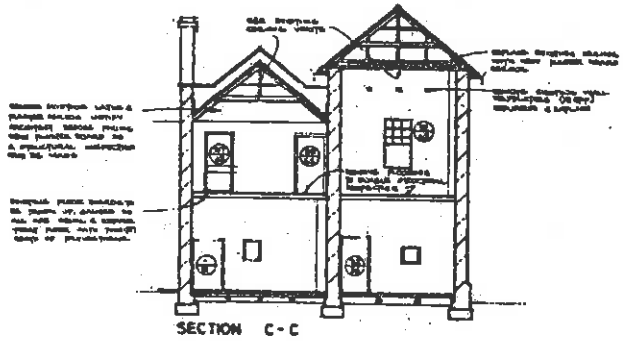
BRICK JOINTS N.T.S.



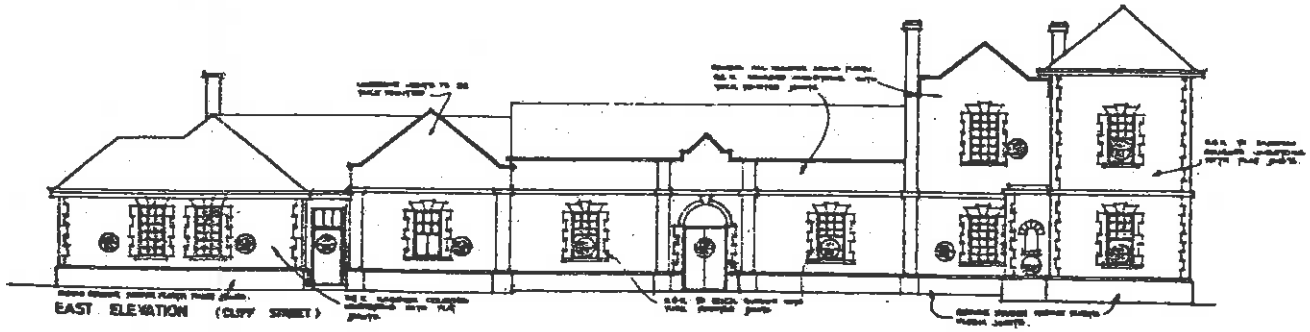
WEST ELEVATION



SECTION B-B



SECTION C-C



EAST ELEVATION (CLIFF STREET)

Job No. 26/6/5
Dwg. No. 5

MECHANICAL

General Description

The individual stages of this building are each air conditioned from separate air handling units, the air being ducted to and returned from the respective areas. The dark rooms are conditioned individually by ceiling hung fan coil units.

The two units serving Stages 2A and 2B are roof mounted, whilst the unit serving the Batavia Gallery (Stage 1) is located within the plantroom.

Chilled water and heating water are both pumped to the air handling and fan coil units which draw from either supply as required to cool or heat the relevant areas.

The chilled water is provided by two roof mounted, air cooled chillers whilst the heating water is generated from a gas fired boiler located within the building.

In addition, the Batavia Gallery system incorporates an electric steam humidifier to increase that room's humidity as required and the controls are of the sophisticated industrial type.

As there are no ceilings in the buildings all ductwork is exposed. Round ductwork was chosen as it fitted least obtrusively into the building.

The concept of basing the air conditioning on a four pipe (two chilled water and two heating water pipes) system was adopted to economically cope with the extremely tight dry bulb temperature and humidity requirements for the Batavia Gallery, 22°C ± 0.5°C temperature and with 65% ± 1% relative humidity.

In order to minimize energy usage the air handling unit incorporates a controlled coil bypass system. This minimizes the sensible to total cooling performance ratio when cooling but no dehumidification is required and minimizes the dehumidification to total cooling performance ratio when dehumidification but not cooling is required. To minimize chiller cycling during dehumidification cycles the system incorporates a special chilled water storage vessel.

The steam humidifier is a rapid generating unit which operates only when humidification is required.

The conditioning of the Stage 2A and 2B areas is not of a critical nature and the systems are conventional, operating only to maintain these areas within the broad human comfort range of temperature.

Stage 2A incorporated a number of descretely operated mechanical ventilation systems to fume cupboards, special wash down troughs and a flexible mounted scavenger system above mobile tables for specific activities.

Three bench surfaces were fitted with a supply air duct at bench edge and return air through the reagent upstand to give a gentle continuous air flow over the work surface. The air flow cannot be too vigorous as this could pick up delicate objects on the bench top but it must be sufficient to remove unpleasent fumes.

In order to maintain the tight temperature and humidity conditions called for in the Batavia Gallery considerable attention had to be paid to the sealing of the building both from air and moisture infiltration.

Special air-tight seals were fitted to all doors in the Batavia Gallery. "Madico RSLW-100-20 Reflector Shield" sun control film which is also an efficient U.V. filter was fixed to all upper windows.

ELECTRICAL

General Description

Electrical services provided were as follows:

Lighting: Incandescent pendant fittings to Galleries generally. The system includes battery operated emergency lighting. The fittings were chosen to match those in use in the building at the time of commencement of the renovations. Lighting tracks for display spotlighting were included in all galleries.

The building is externally floodlit and circulation spaces delineated with bollard lighting in planting area, all controlled by a solar switch with manual override.

Work areas are lit by law U.V. fluorescent tubes mounted on unistrut at the level of the truss bottom chord.

Power: Special features of the power installation include outlets wired to the lighting system for display cabinet lighting.

All G.P.O.'s in the chemistry Lab areas have earth pin switching.

Telephones: A PABX has been installed for Stages 1 and 2A, and Stage 2B will have a separate switchboard as an interim measure. A PABX for the entire complex will be included in Stage 3.

P.A. System: P.A. system to cover ground and first floor display areas and lecture room has been designed with the ability to address individual galleries or all galleries at once.

In a case of emergency the security master control at the security centre has a facility to override the previously mentioned public address systems.

Provisions have been made to extend the P.A. system in the future.

Closed Circuit T.V.: Conduits and draw wires only have been installed for the T.V. system. If funds permit, the balance of the equipment will be installed at a future date.

Allowance for security surveillance in all galleries if required at a later stage.

Security: The security alarm system based on space control using microwave detectors has been installed.

Fire Alarm: A selected detection system has been installed. The detector heads in the Gallery would be thermal/vapour heads. The work areas and stairways have thermal detectors and special heads were used in the workshop area where vapours and heat could set off a false alarm.

Storage areas will have B.C.F. gas smothering system.

Emergency Evacuation Alarm: A special audible emergency evacuation alarm system has also been included and installed.

CONCLUSION

All historical traditions are being maintained at the Commissariat in that, just as the original building programme was carried out in stages, the renovation programme, for other reasons, follows suit.

Originally the building programme was delayed through an acute shortage of skilled tradesmen, while 125 years later, with an unlimited number of tradesmen available, our building programme is being prolonged through lack of funds.

This complex restoration was planned and carried out in stages because the cost of restoration work is very difficult to assess, and funds have always been very limited.

It is hoped, that in spite of all the unforseen problems which are constantly encountered by the museum staff, architects, engineers and builders, the solutions developed and applied will in time prove to be right and that the old commissariat building - now the new Western Australian Maritime Museum, Fremantle - will become the most celebrated historical building in Western Australia of which we can all be proud.