

Few areas of Sydney conjure up such varied images as Kings Cross and mean so many different things to different people.

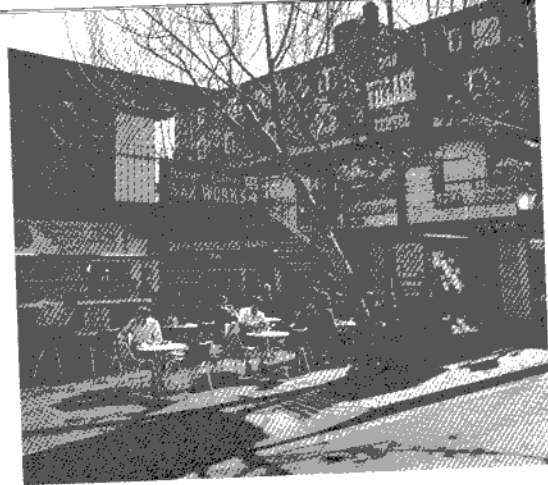
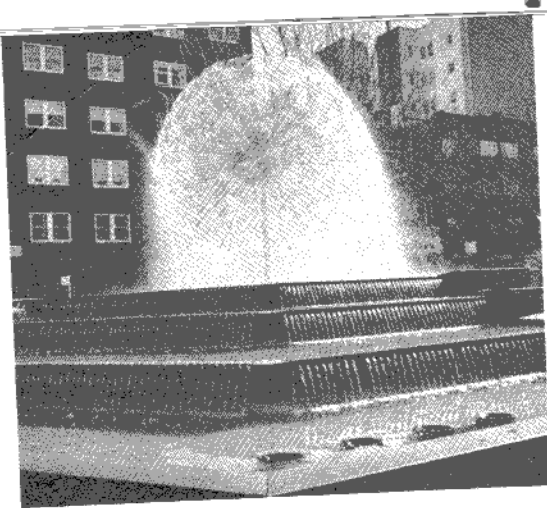
To residents, the Cross is a pleasant place to live, close to the city, only a "hop, skip and jump" to sunny harbourside parks at Elizabeth Bay and Rushcutters Bay and not far from surfing beaches further east. It has all the homely suburban amenities plus an almost unique cosmopolitan "flavour" of its own.

To visitors, tempted by tourist brochures and coaxed by appealing publicity, the Cross has an aura of the exotic and exciting. It seems to have something for everyone - from quiet tree-lined parks to gaudy neon-framed nightclubs, floor-shows from the flashy to the fashionable, shops from the cheap to the expensive and restaurants from the plain to the plush.

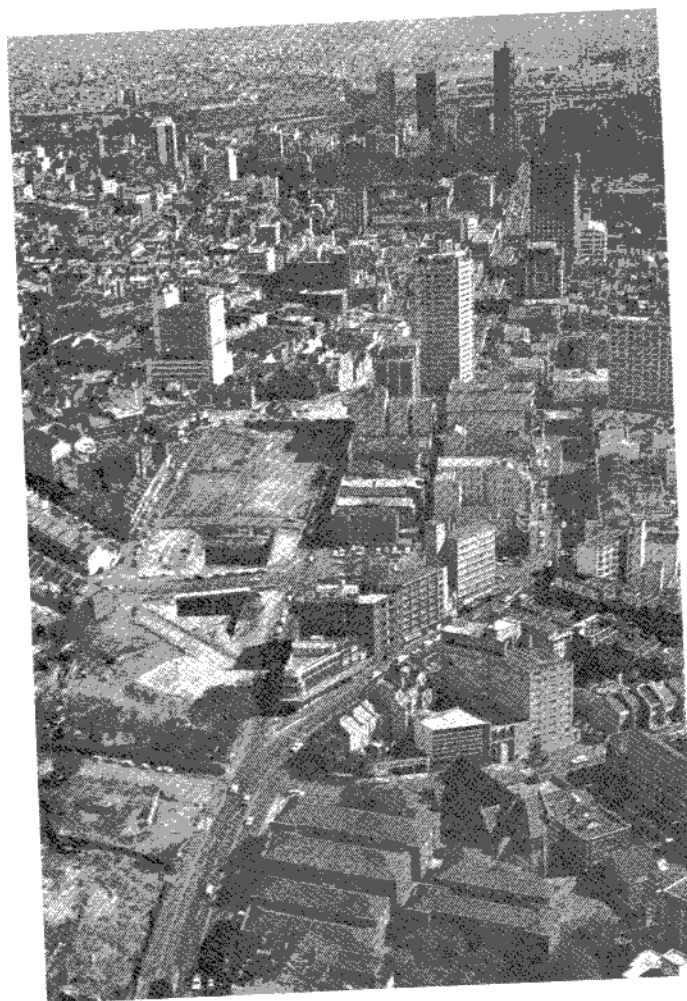
Above all, it has other people - lots of them. For pedestrians, there is always the comfort of the crowd and the fascination of just watching what others do. But, for motorists, other people mean other cars and other cars invariably bring confusion. Cross traffic at the Cross can strain the calmest temper. How often do drivers find their feelings falling from exhilaration to frustration while traffic conditions climb upwards from "comfortably crowded" to chaotic?

Motorists approaching Kings Cross in anticipation of a night of dining and dancing often have the "edge" taken off the evening by the irritation of a bumper-to-bumper crawl at the top of William Street. The tourist passing through Kings Cross, either on his way into the city to see the sights or going out to view the attractions of the eastern suburbs, generally has to weave his way slowly through a mass of other motorists each manoeuvring towards different destinations. Residents living nearby and travelling to and from the city daily have the same problem - only more often.

Therefore, for the many motorists who want to know what is being done to improve Kings Cross traffic movements, details on the following pages explain the design of the Department's road tunnel project and how it will soon help them. It is an article which is intended to outline "what is going on Down Under up at the Cross". There have always been plenty of "happenings" at Kings Cross, and now the Department has joined in the action - with this impressive project.



# KINGS CROSS ROAD



Top left:

El Alamein Fountain . . . evening lights . . . and the fascination of falling water.

Top right:

Footpath refreshments . . . warm sunshine . . . autumn leaves . . . and a background of pavement publicity.

Left:

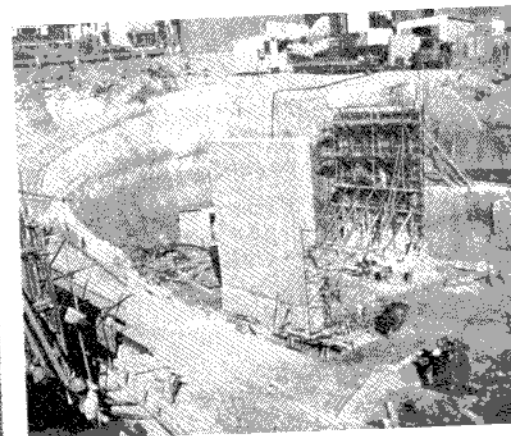
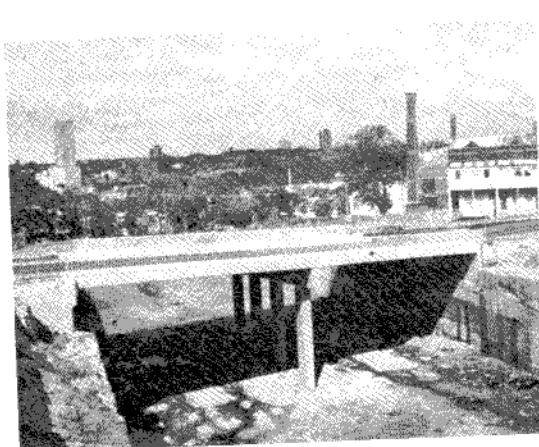
Looking west to the city over the centre of the Cross . . . showing William Street in the middle distance, Bayswater Road on the right, with the tunnel roadworks (and the completed Craigend Street bridge) on the left.

Bottom left:

This bridge at Craigend Street (looking east) will form the eastern portal of the tunnel.

Bottom right:

The first pier of the Victoria Street bridge rises out of deep excavations at the top of William Street.



## An Outline of the Project

The feasibility of constructing a road tunnel under Kings Cross has been under consideration by the Department for a number of years. Various proposals have been investigated, including a review of the respective "virtues" of a long deep tunnel and a shorter shallower tunnel. Following consideration of various factors including estimated cost, technical problems, and likely effect on properties, it was determined that a shallow tunnel would be the best solution. The proposal was publicly announced by the Minister for Highways on 17th February, 1969, and was reported in the March, 1969 issue of "Main Roads" (Vol. 34, No. 3, pages 74-75).

# TUNNEL PROJECT

The purpose of the Kings Cross Road Tunnel is to provide an improved route for through traffic travelling between William Street and New South Head Road. It will eliminate conflict between through traffic and local vehicular and pedestrian traffic at Kings Cross by separating it into different levels. In particular, the large volumes of traffic travelling north and south along Victoria Street and Darlinghurst Road will be carried over traffic travelling east and west through the tunnel.

In the tunnel, dual carriageways will each carry two lanes of traffic. Eastbound traffic will leave William Street near Dowling Street and enter the tunnel at Darlinghurst Road. After leaving the tunnel near Craigend Place this traffic will join Bayswater Road near Roslyn Street. Westbound traffic, proceeding to the City, will leave New South Head Road near New Beach Road, and continue along a new road to be built under the Eastern Suburbs Railway Viaduct at Rushcutters Bay. This traffic will enter the tunnel at Craigend Place and, on leaving, it will join William Street, near Dowling Street (see map on page 20). In the tunnel, a continuous breakdown lane will be provided beside each carriageway.

It is proposed that the area over the tunnel (bounded by Kings Cross Road, Victoria Street, Craigend Street and Craigend Place) will be available for redevelopment on completion of the roadworks. If implemented, this scheme will enable some of the cost of the original land acquisitions to be recovered.

### Investigation and Design

The first aspect of the investigation work involved consideration of how long, and at what depth, the tunnel should be built. Both technical and economic factors were taken into consideration. The technical factors included

- geological studies of the rock which would be encountered, to check such details as its hardness and uniformity,
- projected traffic volumes, and
- the possibility of using a tunnel-boring machine.

The economic factors included the cost of detailed estimates, for alternative schemes of

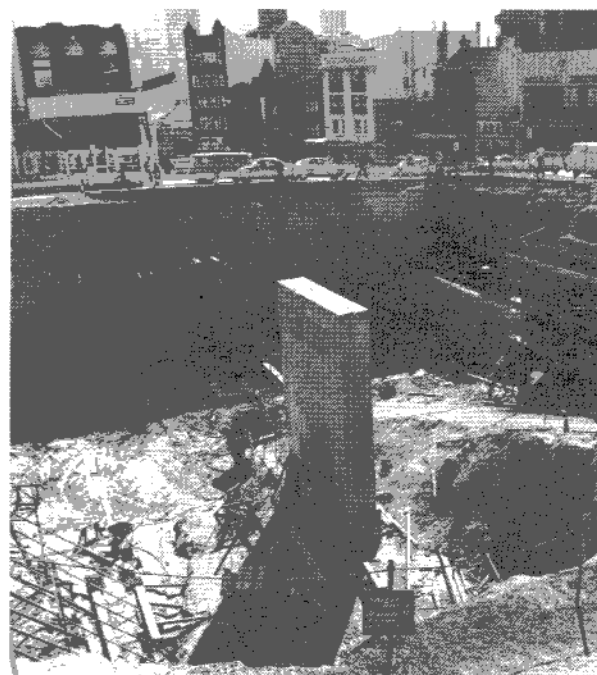
- construction adjustments to public utilities, and
- costs of acquisition of necessary properties.

Following consideration of these factors, the decision was made to adopt a short tunnel at a relatively shallow depth—to be constructed by the "cut and cover" principle, rather than by boring or mining methods.

Before detailed design could proceed, it was necessary for a large amount of subsurface exploration to be carried out. This involved drilling and coring at over 50 test sites, to depths of up to 65 feet. The cores from these drill holes were subsequently examined to determine structure foundation levels and appropriate excavation batter slopes. In addition, unconfined compression tests were carried out on the rock at foundation levels to determine their bearing capacity. The rock is Hawkesbury sandstone, with some layers of shale and clay.



Artist's impression of completed project, looking west



Work is in progress on the construction of the bridge to form the western portal of the tunnel at Victoria Street. This photograph is looking west to the junction of Darlinghurst Road and William Street.

The road design provides for large radius curves to ensure safe conditions and to give a pleasing appearance. The design of the tunnel roadway and the immediate approaches is to expressway standards. Pavement construction is designed to carry heavy traffic and to require only a minimum of maintenance. Alterations to the intersections of surface roads have been designed to allow for anticipated future traffic volumes, and

# KINGS CROSS ROAD TUNNEL

have been finalized following consultations with other traffic authorities.

There has also been close liaison with the Department of Railways to coordinate proposals at the eastern end where the Eastern Suburbs Railway (now under construction) will emerge from a tunnel and continue along a viaduct to Rushcutters Bay.

The structural design for the project is being carried out by the Department. Consulting Engineers, Burn, Griffiths and Associates, have been engaged to design mechanical and electrical services required for the ventilation and lighting of the tunnel, while MacDonald, Wagner and Priddle Pty Ltd, are assisting in the design of foundations for proposed future development over the tunnel. To lessen the effect of a sudden change from full sunlight to tunnel lighting, consideration is being given to the construction of a sunscreen over each tunnel entrance. Each screen will be about 90 feet long and will allow only part of full sunlight through to the roadway.

Each portal of the tunnel is designed as a bridge to carry cross traffic over the tunnel. At the eastern portal, the bridge is at Craigend Place, linking Craigend and Surrey Streets on the south to a new extension of Kellett Avenue (between Bayswater Road and Kings Cross Road) on the north. At the western portal, another bridge will carry Victoria Street and Darlinghurst Road. Both of these bridges will be approximately 90 feet long, having two 45-foot spans and having abutments and centre piers of reinforced concrete. Rock anchors up to 40 feet long will stabilize the abutments. The decks of both bridges will consist of precast, prestressed planks covered by cast-in-place concrete, and will be stressed transversely.

Special provision for public utilities is being made in the bridge at the western portal (Victoria Street) and over part of

the tunnel adjacent to the bridge. Ducts covering a width of 30 feet have been designed to meet the requirements of all the public utility authorities. Some services will also be carried across in the bridge at the eastern end (Craigend Place).

Between the two bridges, the tunnel will be approximately 700 feet long. Structurally it will consist of two outside walls and a central wall between the two carriageways. The ceiling will be suspended from prestressed concrete roof beams. Service ducts and a control room for tunnel lighting and ventilation will be located between the ceiling and the roof. The proposed future development over the tunnel will be supported on footings and columns located in the central wall and beyond the outer walls.

Special consideration is being given to the design of the ventilation and lighting of the tunnel and to the type of wall-lining to be adopted. The reflective nature of the wall-lining has to be fully considered, as well as its "washable" qualities—for ease of maintenance.

To enable pedestrians to cross the eastern approaches to the tunnel, a prestressed and reinforced concrete foot-bridge, 380 feet long, will be constructed from Roslyn Street on the north to Oswald Lane on the south.

This eight-span bridge will consist of two prestressed concrete spans (each 113 feet) and six reinforced concrete approach ramp spans (each 25 or 26 feet in length). The main spans will be constructed using a central "T-shaped" cantilever unit, the top horizontal section of which will extend for 106 feet, i.e., 53 feet on either side of the central pier. This "T" unit will be cast-in-place and will support one end of two suspended precast concrete girders (each 61 feet long). The other end of these girders will rest on piers situated at the junctions with the approach ramps. The width of the footway will be 6 feet and it will be flanked by steel handrailing.

In order to fit in with the planning and environmental needs of this densely populated area of Sydney, special attention is being given to the landscaping of medians and batter slopes. Grass and tree planting will be undertaken to create a pleasing appearance along the tunnel approaches.

## *Property Acquisition*

Before any construction work was commenced, acquisition of the required land was necessary and, consequently, 118 properties were resumed by notification in the Government Gazette of 28th February, 1969. All owners were advised by letter of the effect on their properties and were invited to lodge a claim for compensation. The claims were assessed by the Valuer-General's Department and these valuations (which were based on the market value of the properties at the date of resumption) formed the basis of the Department's negotiations.

As well as the property owners, approximately 600 tenants were affected by these proposals. Tenants who had a compensable interest were able to submit a claim for compensation and these claims were also assessed for the Department by the Valuer-General's Department. A number of tenants received special consideration by the Housing Commission and were allocated alternative accommodation.

To allow property owners and tenants to discuss problems "on the spot" (and also to allow the general public to view artist's impressions of the completed work), the Department set up a temporary office in a vacated shop in Darlinghurst Road. This office was established in March, 1969 and operated until July, 1971.

Following the vacation of properties by owners and tenants, demolition was carried out for the Department by contractors and the cleared areas were

progressively fenced to eliminate any danger to the passing public or to inquisitive children.

#### *Public Utility Adjustments*

In the populous Kings Cross area, there is a particularly large number of public utility mains. Before any construction could be commenced, relocation of these mains was necessary. As previously mentioned, public utility services are being carried across the tunnel in special ducts on the bridges at each portal. Other services, running parallel to the tunnel, will be located in surface streets. Public utility services will not be laid in the tunnel roadway and this will avoid any future interference to through traffic by the utility authorities. The public utility authorities which have co-operated with the Department in relocating and adjusting their services include the Metropolitan Water, Sewerage and Drainage Board, the Sydney County Council, the Australian Gas Light Company and the Postmaster General's Department.

#### *Construction*

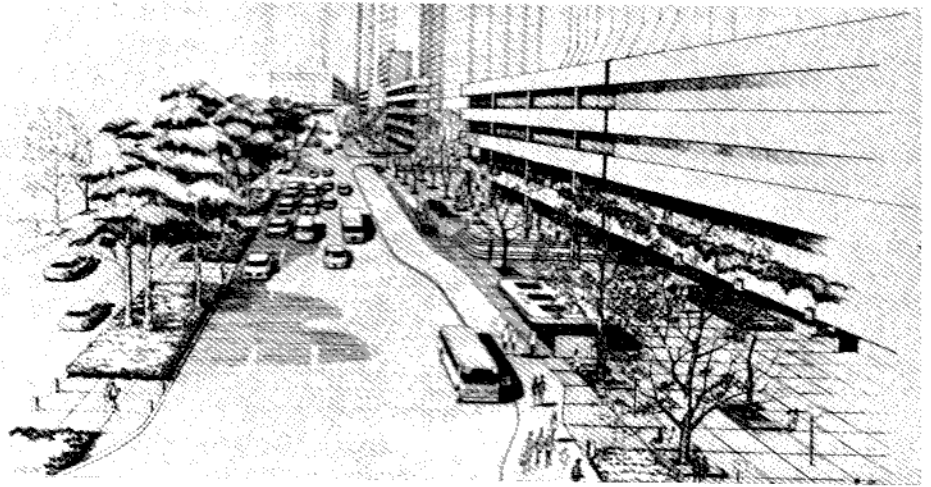
In order that interruptions to vehicular and pedestrian movements be kept to a minimum (especially in such a popular and busy area), and also to enable necessary adjustments to be made to utility services, construction of the tunnel project is being carried out in several stages. These stages have been devised to create as little inconvenience as possible to members of the public who may be visiting or residing in the area, driving or walking, sightseeing and shopping or just passing through.

New bridge structures and some sections of new roadway will be brought into use as soon as they are completed. To maintain a smooth flow of traffic around the work, all stages of construction and proposed traffic re-arrangements have been closely co-ordinated with the various traffic authorities (including the Police Department, the Department of Motor Transport, the Department of Government Transport, and the Council of the City of Sydney).

Signs will be displayed at appropriate locations to guide motorists and the Police Traffic Branch will issue the necessary directions and control traffic to ensure that the altered arrangements operate efficiently.

Some sections of the tunnel project will be constructed by the Department's own forces while other sections will be

## The Council of the City of Sydney's **WILLIAM STREET ACTION PLAN**



*Reproduced by courtesy of the Council of the City of Sydney*

The William Street Action Plan represents a concerted effort on the part of the Council of the City of Sydney and of its landscape and architectural consultants to conceive a master plan for redevelopment.

This plan envisages a coherent integration of all the potential elements of the new streetscape from the smallest details to the facades and envelopes of the buildings themselves.

The aim is to achieve a visual and functional unity appropriate to a busy and important city spine.



On 15th December, 1969, the Council of the City of Sydney adopted a series of proposals which provided for the development of William Street as a beautiful tree-lined boulevard with wide pedestrian footways and colonnaded buildings.

After conferences with this Department, Council resolved on 26th October, 1970 to further widen William Street to provide four lanes of traffic in each direction and to increase the median strip from a width of 6 feet to 16 feet. This would provide turning bays, as well as a refuge for pedestrians crossing the roadway. By giving better scope for landscape treatment, it would have resulted in the creation of an impressive boulevard.

To assist Council officers in the formulation of the concept, Council engaged Bruce McKenzie and Associates, Landscape Architects, as consultants, and encouragement and assistance was also sought and received from the Royal Australian Institute of Architects.

The major part of the widening would have taken place on the southern or sunny side of William Street. The depths of the existing buildings fronting the southern side are limited by a series of narrow lanes, and if this widening had been effected it would have left a residue of about 27 feet. Council therefore resolved on 19th July, 1971 to incorporate this residue of land with the already approved 20-foot-wide southern footway to permit this combined area to be developed as a wide, terraced, landscaped pedestrian mall extending from Yurong Street to the top of William Street.

By these actions the present width of 100 feet between building fronts will be increased at ground floor level to 193 feet, including a 62-foot-wide pedestrian mall on the southern side.

As a gateway to and from the Eastern Suburbs, the Department's Kings Cross Road Tunnel Project will be a fitting forerunner and an appropriate "end piece" to Council's plans for the development of William Street into an attractive road and pedestrian link with the City ●

constructed by contract. Preliminary works, including the southerly extension of Kellett Avenue from Bayswater Road to Kings Cross Road, were commenced by the Department at the end of 1970. The bridge at Craigend Place has already been completed by the contractor, R. M. and B. Coceancig, at a cost of approximately \$80,000 (see announcement on calling of tenders in the June, 1971 issue of "Main Roads", Vol. 36, No. 4, page 122). In view of the difficulties associated with stage construction and traffic rearrangements, the bridge at Victoria Street is being constructed using the Department's own forces. Excavation for Stage I of Victoria Street Bridge and the structure carrying the utility ducts is completed and foundations, piers and abutments are well advanced on these bridges (see colour aerial photograph appearing on page 17 of the September, 1971 issue of "Main Roads", Vol. 37, No. 1).

It is expected that tenders for the main contract, which involves major excavation and tunnel construction between the two portals, will be called later in 1972. Most of the ancillary roadworks will be constructed by the Department's own forces.

The total quantity of excavation for the tunnel and its approaches is estimated to be 160,000 cubic yards. The volume of concrete in the various structures will total approximately 9,000 cubic yards and the area of new road pavement will be approximately 45,000 square yards. The entire project, after allowing for the disposal of surplus lands, will cost approximately \$10,000,000.

Although this project is not part of the planned expressway system for Sydney, construction is being supervised by Mr J. A. Neeson, who in June, 1972, succeeded Mr H. B. Korff as the Department's Engineer for Inner Expressway Construction.

William Street (eastwards from Palmer Street), Bayswater Road and New South Head Road are at present proclaimed as part of Main Road No. 173.

Artist's impressions and a "photo-mosaic" model of the project are on display in the Model Room at the Department's Head Office. Members of the public are invited to come in and view these, together with scale models of other major works, during office hours (8.30 a.m. to 4.30 p.m.) by calling at the Public Relations Section (third floor).

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*This article has been edited from material prepared by Mr G. Percival, who is Resident Engineer at the Department's Kings Cross Tunnel Construction Office, at the corner of Kings Cross Road and Kellett Avenue.*

## THE PRINCIPAL CONTRACT

In May, 1973 a tender was accepted for the major portion of the work associated with the construction of the Kings Cross Road Tunnel.

The contract, which was awarded to Pearson Bridge (N.S.W.) Pty. Ltd., includes site excavation, pavement construction and associated drainage, concrete footings and columns for future air space development, erection of walls and roofing of the tunnel and all mechanical and electrical services.

The price tendered by Pearson Bridge (N.S.W.) Pty. Ltd. was \$1,974,873 and time for completion of the contract is 80 weeks.

## DEVELOPMENT OF AIR SPACE

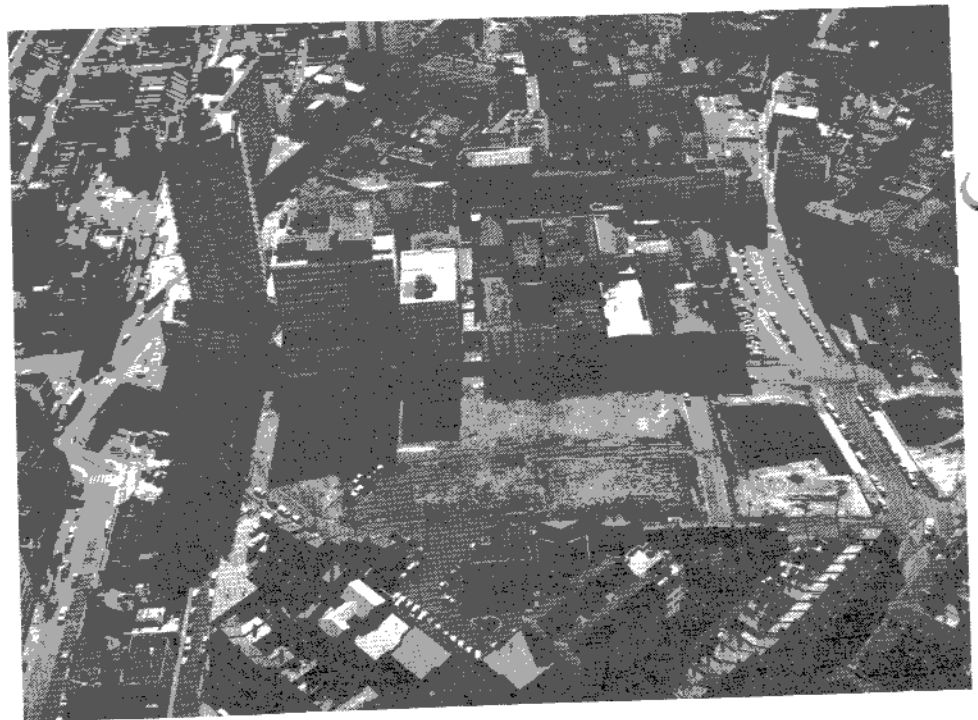
Early in 1973, the Main Roads Act, 1924, was amended to authorise the Commissioner for Main Roads to lease air space above, or, where the roadway is elevated, land beneath certain main roads.

As a result of this amendment, the Department plans to invite tenders for the leasing of the air space above the Kings Cross Road Tunnel for multi-storey development as a commercial and residential site.

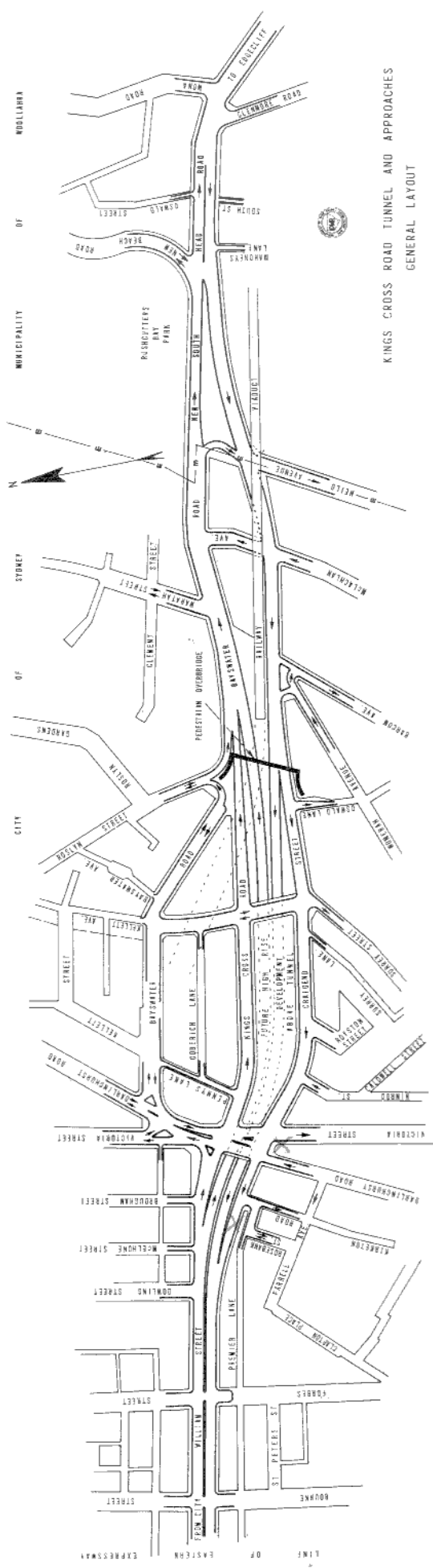
In order to ensure that any building erected in the future above the tunnel does not impose a load on the structure, foundations for the proposed building will be laid prior to the commencement of construction of the tunnel which will proceed around these foundations.

After completion of the tunnel, development of the air space will commence with the erection of a building by the successful tenderer on the columns left protruding above the tunnel roof.

Revenue obtained from the leasing of this site will enable some of the cost of the original land acquisitions to be recovered.



*Aerial view (looking north) showing the area to be excavated for the tunnel—from the completed bridge at Craigend Place (on right) to the bridge under construction at Victoria Street (on left).*



KINGS CROSS ROAD TUNNEL AND APPROACHES  
GENERAL LAYOUT

SCALE: 340 FEET TO 1 INCH