ROYAL ARCHITECTURAL INSTITUTE of CANADA
SYLLABUS

COURSE 233 - DESIGN THESIS

HAMILTON GO TRANSIT STATION

THESIS REPORT

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ABSTRACT

The design for a Hamilton GO Transit Station as developed in this Thesis Project proposes to establish an economic growth nucleus for downtown Hamilton through the concept of a mixed use commercial development integrated with a transit centre.

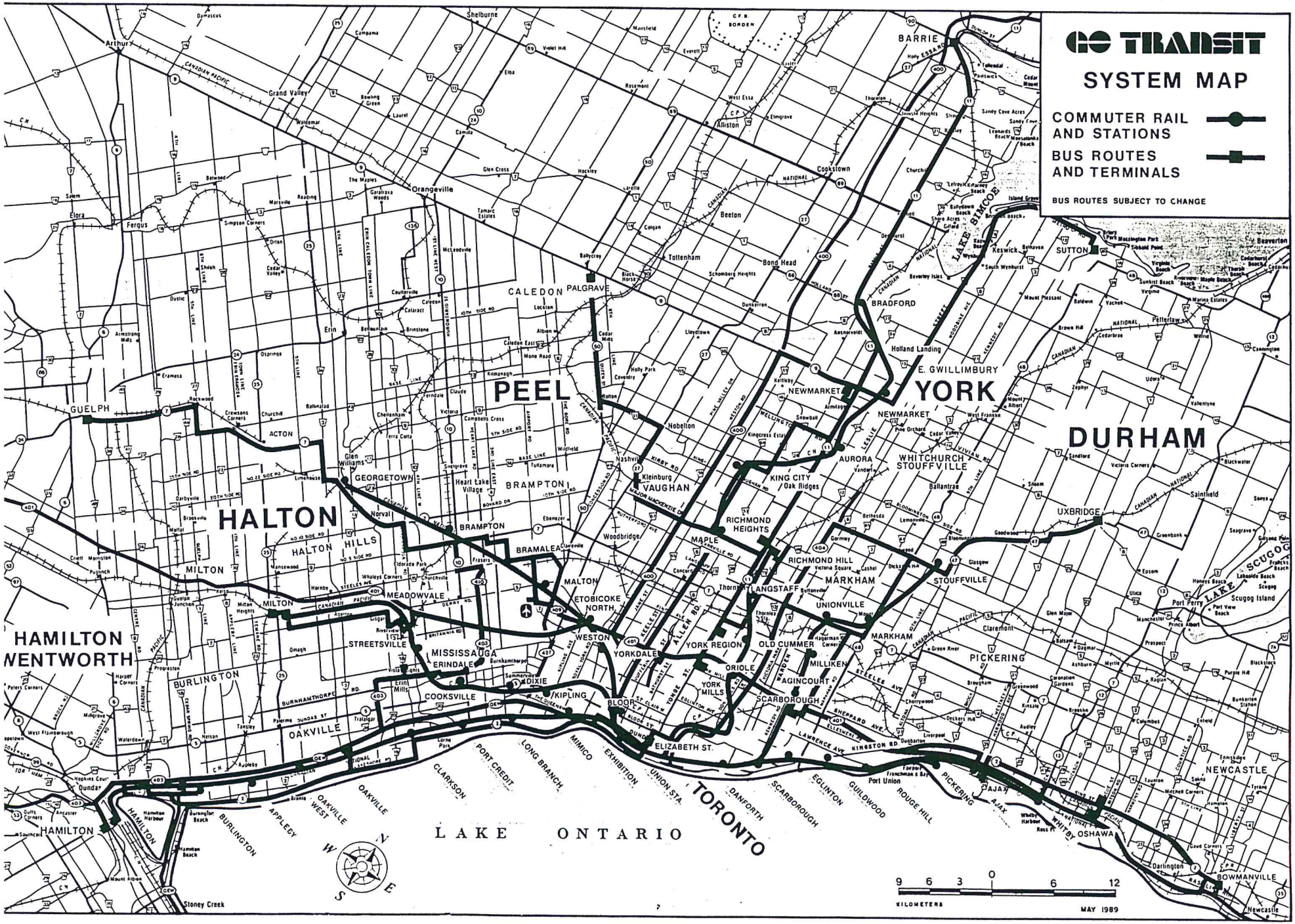
The proposed transit centre consolidates GO Train and GO Bus service in Hamilton (currently using separate termini) to the same location. Inter-regional Bus Carriers, currently sharing facilities with the GO Bus system elsewhere, are also integrated. Interfaces with the muncipal bus system (Hamilton Street Railway) have been established. Relationships to pedestrian movement systems have been created through the judicious location of entrances/exits and the provision of overhead protection elements. All of these components, including nominal provisions for taxi stands and kiss 'n ride locations, combine to create a true intermodal transit station.

The mixed use commercial development includes street level leasable retail accessible from an interior bus mall, three levels of leasable office space above the train platform as well as walk-up leasable studio and office space in a discrete building element conceived as a "streetscape" component on Haymarket Street.

These elements are composed on the framework of two pedestrian axes configured at right angles to each other. The first is a glass-roofed atrium extending from East (John Street) to West (James Street) and centred on the train platform. The other axis is aligned North-South on the former location of Hughson Street (closed in 1933) and connects Haymarket and Hunter streets by bridging over the bus driveway and underpassing the train tracks by escalator and stair.

These two axes intersect in the former waiting room and concourse of the existing Toronto, Hamilton and Buffalo Railway Station which, although abandoned, has been preserved, restored and integrated into the project.

Nominal provision for private automobile parking has been made with an underground garage. The limited size of the parking facility is intended to discourage its use, thereby encouraging use of public means of transportation.


GO TRANSIT
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COMMUTER RAIL AND STATIONS
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BUS ROUTES SUBJECT TO CHANGE
PEEL
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INTRODUCTION AND ACKNOWLEDGEMENTS

The Government of Ontario, through its GO Transit System, currently provides public transportation between urban centres in a central south area of the Province centred on Metropolitan Toronto. One component of the system is the Lakeshore West Corridor which extends from Toronto along the north shore of Lake Ontario and terminates at the City of Hamilton approximately 65 km to the West.

Currently, an express bus service operates on a full time basis directly between the two cities. In addition, regular lakeshore buses run on a full schedule between Toronto and Hamilton serving municipalities situated between these termini. Full train service, however, extends only as far west as Burlington (20 Km. east of Hamilton). Only three trains each way connect Toronto and Hamilton on weekdays.

In 1987, the Ontario Ministry of Transportation (MOT) commenced feasibility studies to extend full GO Train commuter service west to Burlington and Hamilton. At the time of submission of the proposal for this Thesis in April 1989, the MOT had completed studies identifying route and service alternatives and had held public presentations to receive public participation. At that time, an environmental impact assessment was under preparation, but had not yet been made public.

Currently, in December of 1992, the environmental impact assessment for the project has been approved by the Ministry of the Environment, pre-design studies have been completed, and final design is in progress.

In the City of Hamilton, GO Trains currently service the Canadian National/VIA Station on Murray Street, some eight blocks north of the city centre in a largely residential neighbourhood. GO Buses share cramped facilities with other Inter-regional Carriers, such as Canada Coach and Greyhound at the Rebecca Street Terminal, two blocks east of the city centre. In addition to GO Transit's desire to consolidate train and bus

services in one location, the replacement of the congested and outdated Rebecca Street Terminal has been the subject of several previous studies.

Also existing in the City of Hamilton is a separate railway line now owned by Canadian Pacific, but formerly the property of the Toronto Hamilton and Buffalo Railway Company. Only three blocks distant from the city centre is the former TH & B terminal and office building, built in 1933 as the flagship of the small independent company. The building, now largely disused, is listed by the Local Architectural Conservancy as an historic and landmark building in the city. Also in 1990, the building was designated for preservation under the Federal Heritage Railway Stations Protection Act.

These factors combined provided an opportunity through a realistic framework for an architectural project suitable for a design thesis problem, i.e. a Hamilton GO Transit Station to be sited on the former TH & B Terminal property and utilizing the existing CP tracks. Other factors, however, would provide the substance to elevate the study beyond a mere architectural design problem, i.e. to generate the proposition necessary to undertake a Thesis. Foremost was a long standing personal interest in environmental issues and a strong belief that increased use of public transportation systems will do much to improve air quality, abate the disappearance of farmlands, reduce energy consumption and ameliorate personal health. Second was a personal conviction that much of what is wrong with cities today stems directly from the dominant role that the car has played in the development of urban environments, and that increased use of public transportation, combined with a more submissive role for private automobiles, would provide new opportunities to improve the quality of urban life. This conviction is given credence by Jane Jacobs, who commented in 1961 that "the present relationship between cities and automobiles is one of those jokes that history sometimes plays on progress". (1)

Third was a personal observation that reliance on a Toronto-centred region planning model was contributing to environmental degradation by increasing commuting distances to municipalities as far from Toronto as Guelph, Barrie

and Bowmanville. In addition to environmental concerns, other issues seemed relevant. What of the economic decline of smaller urban centres whose residents are forced to commute to Toronto to seek employment? What of the social and personal health costs of employees who are forced to spend hours commuting daily because the cost of housing in Toronto has exceeded their means?

Out of this realistic framework for an architectural design problem and these personal interests, beliefs, convictions and observations, a Thesis Proposition developed. The proposition hinged on understanding what roles the architect could play in the development process, and how these roles could counter the reliance on Toronto-centred Region planning and further the use of public transportation.

One of these roles it that of architectural programmer. Clearly the programme for a transit station in a system designed to take commuters from Hamilton to their jobs in Toronto would be different from that of a station conceived to serve commuters coming to work and to shop in Hamilton. By considering Hamilton as an economic subcentre in its own right, commuting distances could be reduced, and more efficient use made of transit facilities.

The other role that the architect can carry out in the process of change is that of the architectural designer. Automobile manufacturers have clearly understood the value of good design with careful attention paid to the comfort and convenience of vehicle passengers. Most people, on the other hand, will likely describe a bus station as a dimly illuminated, barren place, where users are forced to inhale exhaust fumes and stand on cold drafty platforms waiting for their next connection. No wonder public transportation is losing the struggle to convince commuters to abandon their cars and "take the better way".

It is here that the architect can make the most valuable contribution by creating a transit environment which is comfortable, convenient and exciting

to use. Clearly, the architect must not be hampered by severely restricted budgets if this objective is to be achieved. This will require the support of society to realize the return (improved environmental quality) on such an investment, and to, therefore, elect governments which will divert funds from highway construction to public transportation investment, increase the cost of operating private automobiles, and apply our best technology and design to mass transit.

It is hoped that this Thesis has reasonably demonstrated a possible physical outcome of these objectives and, thereby, successfully advanced the Thesis Proposition. If success has been achieved, credit cannot entirely be claimed by the author, whose indebtedness to the following contributors for their assistance is gratefully acknowledged:

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References

(1) Anderton, Frances; "Collision or Vision", The Architectural Review, December 1989, pg. 23.

THESIS PROPOSITION

1. The Hamilton GO Station should not be another suburban station serving Toronto and increasing the dimension of its commutershed.

2. The Hamilton Station presents an opportunity to act as an economic growth nucleus for downtown Hamilton through the concept of a mixed use commercial development integrated with a transit centre.

3. It is desirable to consolidate GO Train and GO Bus service in Hamilton to the same location integrating other inter-regional Bus Carriers currently sharing facilities elswhere in the City. It is also desirable to interface with municipal bus service (Hamilton Street Railway), thereby creating a true intermodal station which has been demonstrated to be a current theoretical concept of the building type in question.

4. The Hamilton Station should accept commuters from its own environs, e.g. Guelph, Oakville, Cambridge, Brantford, Burlington and possibly Niagara in the morning and return them in the evening. On a smaller scale, the Hamilton Station should do for Hamilton what Union Station does for Toronto. This is desirable on the basis of social, economic and environmental objectives.

5. Parking should be minimized at the Hamilton Station in order to encourage use of public transit, reduce traffic congestion within the urban core, avoid the expenditure of valuable lands for vehicle storage, and reinforce the objective that the Station should not serve Toronto.

6. The existing former Toronto Hamilton and Buffalo Railway Station building which occupies part of the site has been demonstrated to be of historical and cultural significance. Since publication of the Research Report for this Thesis, the building has been designated for protection under the Federal Heritage Railway Stations Protection Act. The programme for this Thesis will include preservation and restoration of

the existing station as well as integration of it into the new mixed use project. Again, this is a current theoretical concept associated with this building type.

7. Architectural design through the application of the best possible technology is an effective tool to increase use of public transportation by creating convenient, comfortable and exciting transit stations. This will require a socio-political commitment to properly fund such projects on the basis of improved environmental quality as society's return on investment.

PROBLEM SOLUTION

This discussion of the problem solution will explain how the design has satisfied the programme requirements. As a framework, the design proposal will be described on the basis of each of the major programme components - Train/Bus Station, Train Platform, Bus Platform, Leasable Retail, Leasable Office, Parking Garage, Building Services and General - with attention paid to the logic of design decisions. For a detailed description of the programme, the reader is referred to Appendix B; Hamilton GO Transit Station Architectural Programme, May 1991, revised October 1991.

As well, the design solution will be discussed in terms of its success in substantiating the Thesis proposition. Each of the seven components of the proposition will be individually reviewed.

Finally, the reader is referred to the reductions of architectural design drawings and photographs of the architectural model which are included in this report immediately following this discussion.

Train/Bus Station

This component of the programme fulfills requirements common to both the train and bus functions, such as ticket sales, management, personnel support, public facilities and some component of waiting and circulation.

Given the need of these areas to equally service 28 bus bays and a 300 m long train platform, a central site location was appropriate. Also, since the majority of the city's central business district was situated to the north of the site, a location for the station facilities which addressed Hunter Street was dictated.

The existing former TH & B train station building was situated at the prescribed location, and a decision was therefore made to preserve and restore the former station concourse, waiting area, ticket office and rental

area to accommodate these functions. This would also place these facilities at the intersection of Hunter and Hughson Streets - a node whose importance was accentuated by the provision of a pedestrian thoroughfare through the building on the former alignment of Hughson Street, which had been closed in 1933 to construct the TH & B building.

Ticket sales functions have been split in two areas by the existing station vestibule, elevator lobby and the Hughson Street axis. It is assumed that this could be made workable by allocating four sales wickets to GO Transit, and the remaining four wickets to the other five Inter-Regional Bus Carriers who will be utilizing the station.

Queuing would be organized in an east-west alignment using stanchions to ensure first-come first-served propriety, and to minimize interruption of east-west traffic flows from the existing station entrances/exits.

Ancilliary sales functions, such as the lunch/meeting room, manager's office, cash room/vault, information office and washrooms are arranged ensuite with the sales wickets. This will support communication and security associated with the sale of tickets and provision of information.

Drivers' lunch/rest area, washrooms and lockers have been configured in a suite central to the facility and adjacent to the bus bays and driveway. Exterior exposure will provide some natural light. Entrances directly from the bus driveway and from the building interior are provided.

The security office and janitorial room have also been centrally located, given their need to service the entire facility. It is assumed that security monitoring will be carried out by closed-circuit television in addition to regular rounds. Direct access to the security office from the station interior is provided for enquiries. Access to the bus driveway for security personnel is possible through each of the bus loading gates.

The shipping/receiving area and the garbage area are given direct access to

the bus driveway from where pick-up and delivery will occur. Given the availability of only one loading dock because of a constricted site, a shipping/receiving lay-by area has been provided. Two elevators provide direct access from shipping receiving to other floors of the building.

Public washrooms are located with direct access from the queuing area. This will permit visual monitoring of the washroom doors from the ticket sales wickets. Reasonable proximity of the washrooms to the security office will ensure rapid service if required. Provisions for the disabled and diaper changing have been incorporated.

Storage requirements have been relegated to the Basement Level of the former TH & B Station. Access by the existing elevator is available.

Interior, historically accurate, restoration efforts will be confined to the waiting/concourse area of the former TH & B Station, with its terrazzo floors, enamelled steel wainscotting and column covers, stainless steel Art Moderne light fixtures, high ceilings and clerestory windows to the train platform above. The curved rear wall of the former waiting area will be preserved as an "interior facade" with its many perforations, which formerly gave access to baggage and customs areas, opened up to connect to the new areas of the transit facility located beyond. It is hoped that during the idle time of queuing to purchase a ticket, station users will reflect upon the historical atmosphere which surrounds them.

Train Platform

The effects of changing the vertical alignment of the existing railway tracks would have far-reaching effects both east and west of the project site due to the shallow gradients required by trains. The decision was, therefore, made to accept the given vertical alignment of the tracks and to locate the train platform at the existing level above the station concourse and approximately 5.7 m above both John and James Streets.

A centre platform configuration was selected to enable two tracks to be simultaneously serviced by a single set of vertical circulation elements, i.e. stairs, escalators and elevators. These elements were arranged to facilitate pedestrian movement to and from station entrances at John Street, James Street, Hughson Street, the municipal bus lay-bys off Hunter Street, and the ticket sales area. Additional exterior stairs direct to the train platform from municipal bus lay-bys, sheltered by the bridges at John and James Streets, have also been provided.

The entire train platform between John and James Streets is a fully enclosed interior climate-controlled environment, surmounted by a skylight forming a four storey high atrium space running the length of the building. As well as serving the office floors above, the atrium will admit natural light to the train platform, and support the growth of interior plant life.

The walls between the train platform and the tracks will be curtainwall glazing with automatic bi-parting glass doors positioned to coincide with the locations of the passenger car doors. To assist the train to be parked in the correct position, the architectural doors will be made 50% wider than the vehicle doors. This approach has been used successfully in Tokyo, and is being considered for the Toronto Transit Commission Yonge/Bloor subway station as a means of preventing users from being accidentally pushed onto the tracks when the platforms are congested. In the case of the Hamilton Station, the purpose would be climate control for the users, since the diesel-fired locomotives cannot reasonably be brought into an interior environment.

Because of the length required for a 10 car passenger train, the platform has been extended as an exterior environment across the bridges over John and James Streets. An opening between the two tracks has been provided in each bridge to bring natural light to the street below. The bridges have been configured to provide vertical weather protection for the municipal bus lay-bys and station entrances below.

The exterior platforms are vertically weather-protected by glass canopies which culminate in glazed enclosures for stairs linking to municipal bus lay-bys below. Exterior overhead protection for passengers boarding and disembarking to/from the interior platform area is provided by the soffit of the leasable office floor level above.

Although the vertical alignment of the existing tracks has been maintained, the horizontal alignment has been altered to widen the centre platform to 14.5 m. This creates sufficient platform floor area to support the programme load, meet GO Transit engineering standards, allow the provision of tandem stair/escalators, and permit floor openings to admit atrium light to the bus/retail areas below. In order to maximize light penetration to the bus/retail areas while maintaining sufficient train platform area, the floor of the platform has been given many glass-block filled openings.

At the west end of the station, the platform must narrow and bend as the tracks converge to enter the single lane Hunter Street tunnel. At the centre area of the platform, where the tracks pass over the existing former TH & B waiting area, the horizontal alignment was somewhat constrained by the need to coincide with existing structural elements and not disturb the historical architectural space below.

In addition to the two passenger tracks, a third freight track has been reserved for the use of Canadian Pacific. It is assumed that such a provision would be part of any deal that would give GO Transit access to the track right-of-ways. Required horizontal and vertical clearances to adjacent structures have been provided for all tracks.

Although it is not anticipated that diesel locomotives would come to rest under the soffit of the office building, some measure of exhaust fumes would occur as the train passes through the building area. To deal with this and unforeseen circumstances, mechanical ventilation of the soffit area would be provided via four of the eight vertical service shafts which also serve the office levels above.

Floor paving, benches, lighting, signage and interior plants would be manipulated to give the train platform the character of an interior glass covered street. These elements, combined with the glass vertical walls permitting views of the city skyline beyond, and the dramatic activity of office traffic crossing the atrium bridges above, are intended to create a waiting environment which is pleasant, convenient and interesting. It is hoped that such an environment will convince more commuters to utilize the trains.

Bus Platform

The majority of inter-regional bus traffic will approach the site southbound on James Street, and leave the site northbound on John Street. This is a consequence of the location of the project site with respect to major streets and highways serving the city.

These facts, combined with the alignment of one-way streets surrounding the city, suggested a one-way bus driveway running from west to east and serving a 45^{o} docking arrangement of bus platforms. The backing-up of bus vehicles required with a 45^{o} docking platform arrangement is not ideal by GO Transit standards, but is considered acceptable for urban situations where land costs are high and situations are congested.

The situation is, however, further aggravated by the need for the buses to make counter-clockwise turns into the platform dock. An investigation of the feasibility of changing one-way street directions was considered, but rejected following discussions with the City Traffic Department. It was, therefore, determined to accept the one-way eastbound bus driveway with the 45^{o} docking platform requiring counter-clockwise turning, and to resolve as much as possible the problems inherent in the arrangement.

Because of the widening of the train platform above, part of the area available for the bus bays was located below the tracks. In order to maintain sufficient overhead clearance for the buses and depth for the

structure supporting the tracks, the level of the bus driveway and platform was situated approximately 1.5 m below the level of the existing train station concourse. This level is approximately the same as the level of the roadways below the John and James Streets bridges. As a result, interior stairs and ramps were provided to negotiate the change in level in the station interior.

The bus bays have been configured in two groups east and west of the centre of the station. Each group was provided with a dispatch office elevated above the station floor to assist in the visibility of all bus bays. It is assumed that one group would be utilized by GO Transit and the second group by the other Inter-Regional Carriers who will service the station.

The bus platform has been organized along an east-west interior pedestrian space which extends from James to John Streets. The space is aligned with the train platform and is skylit by the atrium through large openings provided for the escalators and stairs to above and by glass block panels in the train platform floor. On the north side of this space, leasable retail areas have been provided. On the south side, a curtainwall of glass and aluminum separates the interior bus platform from the exterior bus bays. This arrangement is intended to improve the comfort and convenience of transit users, and could be described as a "bus mall".

The demising curtainwall sawtooths coincident with the bus bays, thereby identifying and defining waiting and access spaces associated with each bay. This platform area is further defined by a row of columns supporting the south passenger track above.

Each bus bay is provided with an exterior access door, permitting patrons to wait within the comfort of the station interior until their bus is ready to be boarded. This waiting arrangement also resolves one of the problems associated with a counter-clockwise turn into a 45^{o} docking platform, which is that the front right bumper of the bus passes over the platform on which patrons may be waiting.

The provision of retail space adjoining the bus mall is also intended to improve the comfort and convenience of transit users by providing services which can be utilized during the idle time of waiting without the concern that one might miss their bus. This subject will be considered further under the discussion related to leasable retail areas.

Layover bus bays have been configured on the south side of the driveway. These will be required to be backed into. In addition, parking spaces accessible from the bus dirveway have been provided for the use of staff, emergency and service vehicles and bus parcel express (BPX).

Leasable Retail Space

Leasable retail spaces have been provided in this project for two reasons and, therefore, the location and layout of these spaces has been arranged accordingly. The first of these reasons is to provide a return on investment to a developer who might be convinced to enter into a joint venture arrangement with GO Transit. This, it is reasoned, could provide some capital to fund amenities usually not found in transit buildings, such as atria or bus malls, on the basis that such amenities are of equal benefit to the developer.

Thus, leasable retail areas must be arranged to ensure the survival of their tenants by sufficient exposure and accessibility to their projected market. In this case, it is reasoned that the major market for the merchants will be the users of the transit systems and the workers occupying the office floors above. Prime exposure is, therefore, given to the interior mall and atrium space which is shared by most potential purchasers. Tenants would be free (within reasonable design guidelines) to determine and establish their own storefront within the bus mall as required to market their services/goods and to secure and define their leased area.

A secondary market source would be pedestrians passing by the transit centre on John and James Streets and through the exterior arcade along Hunter

Street leading up to the east and west entrances of the existing former TH & B building. To capture this market share, large display windows have been provided in the adjoining exterior walls of the building, and exterior store identification signs would be permitted (again with reasonably prescribed design guidelines).

Within the existing former TH & B building, a leasable area is proposed in the space west of the queuing area. This space is somewhat unique because of its accessibility both directly from the station interior and from the exterior of the building. The area historically served as a restaurant, and would continue to be a good location for one because of its double accessibility, its central location, and its proximity to public washrooms. As such, appropriate mechanical and electrical services would be supplied to this location.

All of the above-mentioned leasable retail areas could be serviced by shipping and receiving during non-peak transit hours from the municipal bus and taxi lay-by areas to the north of the building or from the shipping and receiving area accessible from the bus driveway.

Four further unique retail spaces have been made available at the Track Level above the bus driveway. These spaces are intended to capture the pedestrian traffic anticipated to enter/exit the station from/to Hughson street to the south. These are small areas (50 and 100 sq.m.) intended to house small proprietor-operated specialty shops. They would be serviced from the lay-by on Haymarket Street.

Because of the relatively small retail component in this project, requirements for public washrooms, security office, housekeeping and garbage areas have been consolidated with those provided to serve the train/bus station. The retail leasing management office would be located in one of the existing office areas on an upper floor of the former TH & B building.

Finally on the subject of leasable retail areas, it was determined at the

preliminary design stage that a discrete building element would be provided along the north side of Haymarket Street supported over the parking exit ramp, staff parking and layover bus bays. The intention of this design component was to provide some visual continuity to the streetscape of Haymarket Street through the introduction of a facade of traditional "storefront-with-walkup-office/apartment" scale. This was perceived to be in keeping with the existing visual quality of Hughson, Haymarket, James and John Streets south of the existing tracks.

Unfortunately, late in the design process, it was realized that the dimensional constraint of required vertical clearance above the bus driveway would result in a "ground floor" elevation too high above Haymarket Street to be marketable as retail space. Confronted with the decision to abandon this design component, it was instead decided to market it as a quasi-retail space described as "leasable studio". What is suggested is that these spaces would be of interest to artists and designers who depend less on incidental street traffic for sales. Such parties could include potters, painters, sculptors, fashion designers, photographers and the like.

The glass enclosed spaces shared by the leasable studio modules could be used for exhibitions and shows. Leasing rates would be made affordable on the basis of the positive influence of such tenants on the character of the area.

Returning to the original statement of this discussion regarding leasable retail spaces, it is secondly suggested that the provision of leasable retail spaces will benefit the project by increasing the convenience of the use of public transportation. Much of the attraction of private automobile use is the ability to attend to miscellaneous errands enroute while commuting. The provision of such possible tenants as a convenience store, dry cleaner, shoe repair, hair stylist or video rental shop would enable commuters to attend to some errands while travelling by public transportation.

Another perceived problem with commuting by transit is the time wasted while waiting. (Transit users know, however, that travelling time can be usefully applied to reading rather than being stalled in rush hour traffic). The ability to, say, browse through a bookshop while waiting for a bus or train will do much to counter this perceived loss of time, and to thereby increase the attractiveness of commuting by public transportation.

Leasable Office Space

The reasons for providing leasable office space in combination with the transit station are two-fold, and similar to those advanced under the discusssion of leasable retail space. Firstly, rental income will hopefully convince a developer to jointly venture the project with GO Transit, thereby providing some capital to fund building features, such as the atrium, which are mutually beneficial to both investors. Secondly, the direct accessibility of workplace from the public transportation system is intended to demonstrate the potential comfort and convenience of commuting by transit, thereby inciting more individuals to travel by this means and to leave their cars at home.

Hopefully, the project would spawn further development on adjacent sites with direct linkages along and under streets to the transit station. Eventually a network of weather-protected pedestrian ways along and below streets could develop making the use of public transportation increasingly attractive. Developers who incorporate such linkages could be given reductions in the requirement to provide parking facilities. In addition to decreasing development costs, this would discourage commuters from using their cars, since parking would be difficult to find.

Returning to the leasable office areas included in this proposal, they have been configured on three levels spanning above the railway tracks and opening onto the atrium spine running the length of the building above the train platform. It is intended that by this arrangement the atrium will mutually benefit both commuters and office workers, lending further

justification to the expense of its construction. The atrium will also provide direct visual comprehension of the intended relationship between office and transit functions, thereby reinforcing the demonstration of the project objective. A secondary benefit will be the horizontal weather protection of commuters by the soffit of the office levels as they pass from the train to the platform.

Access to the office floor levels is provided by six elevators arranged in duplex operation at three locations. These elevator banks correspond with three street addresses for the office building - two on Hunter Street and one on Hughson Street at Haymarket south of the station. Access to/from the office building is possible when the transit station and retail areas are not in service and, therefore, secured. Two banks of elevators (4 cabs) also provide direct connections between the train platform, parking garage and office floor levels. The third bank (2 cabs) makes direct connection between the office floor levels and the shipping receiving area at the bus driveway.

Eight vertical service elements will provide exit stairs and mechanical/electrical service shafts for the office levels. These vertical building elements will also provide suitable surfaces for mounting of corporate identification signage for the major tenants.

Access to the office levels and incorporation of a further building element for address and identification has been provided at the intersection of Hughson and Haymarket Streets along the interior pedestrian way leading to the station.

Horizontal circulation between leasable areas has been provided through the atrium along the edges of floor openings connecting all elevator lobbies. These circulation areas have subdivided the floor plates into a range of leasable floor areas, ranging from 300 to 2800 net sq.m., providing the flexibility to accommodate a variety of tenants. Additional vertical circulation is possible through two open intercommunicating stairs located

in the atrium and connected to all office floor levels.

Washrooms have been provided in several locations for the mutual use of office tenants. Housekeeping areas have been allocated adjacent to the washrooms.

Lastly, some walk-up leasable office areas have been provided at the upper level of the discrete streetscape building situated along Haymarket Street. These areas might be suitable for prospective tenants with some affinity to the studio tenants, such as architects and other design professionals in graphics, fashion or industrial products. Small elevators are provided for barrier-free access and shipping/receiving purposes.

Parking Garage

After consultation with the City of Hamilton Traffic Department, it was decided to limit entry to the parking garage from James Street, and exit into John Street only. This arrangement would minimize conflict with existing traffic patterns and the proposed bus driveway entry and exit.

It would also permit southbound traffic to exit the garage and northbound traffic to enter the garage using Hunter Street to crossover to the opposite side of the station. Lastly, it would permit exiting from the garage to be controlled from one location, thereby minimizing operating costs.

Access to and exit from the existing parking garage at 135 James Street South has been integrated into the circulation system of the proposed parking garage.

The four vertical building elements along Hunter Street serving the office floor levels will descend to the parking garage level providing exits, and vertical service spaces for mechanical ventilation.

It is assumed that the majority of cars parked will belong to visitors to

the commercial aspects of the project and to senior employees, or be corporate vehicles.

Building Services

Chilled water and heating water will be manufactured in a main mechanical penthouse at the south central area of the building with three boilers, and two chillers. Two cooling towers will be situated in an open air enclosure on the rooftop adjacent to this penthouse. This penthouse will also accommodate a large exhaust fan servicing the central atrium and washrooms as well as two air handling units for HVAC of the third south office level, the central main level and the small retail areas at Hughson and Haymarket. Two vertical shafts descend from this penthouse to the main level.

From this main mechanical room, chilled water and heating water will be piped to 22 air-handling units distributed amongst 8 additional mechanical rooms situated at the top of the eight vertical building elements which enclose the service shafts required for vertical distribution of ventilation ducts and piping. This dispersion of equipment will minimize duct runs and required associated ceiling cavity space. It will also facilitate the zoning of environmental control of various tenant areas and allow, where possible, for the electrical costs of operating the air-handling equipment to be incurred by the tenant being serviced rather than the landlord.

The dispersion of HVAC zoning will also permit the sizing of equipment and the distribution of control systems to be responsive to the varying climatic factors (i.e. solar gain, heat loss) that will be experienced by tenant areas.

Conditioned supply air will be ducted through a variable volume system to all office floor areas. Return air will be ducted and the system will use a portion of recirculated air mixed with sufficient outside air to provide a fresh environment to occupants. As an energy conservation measure, provision will be made for free cooling when outside conditions are

appropriate. Room conditions will be maintained by modulating the air quantity supplied to an area in response to a thermostat in that area.

Office levels will also be heated by a forced hot water reverse return constant temperature system fed from natural gas fired boilers, pumps and controls located in the main mechanical room. All exterior walls will have continuous fan convector heating cabinets below the windows.

The major interior volume interconnecting the bus mall, train platform and atrium will be supplied with fresh conditioned air distributed down through two shafts through the parking garage and up into the cavities below tandem stair/escalators and dispatch offices at six locations. From here, air will be supplied to the main level concourse through wall-mounted diffusers at low level. Conditioned fresh air will also be supplied to the train platform through the soffit cavity below the first office floor level to continuous linear diffusers above the north and south walls of the train platform.

Air will be exhausted at the high level of the atrium at 3 locations with some energy conserved via a heat recovery system.

Retail areas at the main level will be provided with a packaged water-cooled air conditioning unit mounted at the ceiling level as well as piped chilled and heating water. These units will be supplied with ducted fresh make-up air drawn from the bus platform/mall air volume. Final air distribution will be left for tenant improvement, and electrical costs to run the air-conditioning units will be incurred by the tenant.

Perimeter hot water heating through convection cabinets will be provided at the bus platform and the leasable retail areas. These units will be integrated below seating at each of the bus bays.

Dedicated exhaust systems will be provided for all washrooms and housekeeping areas, the parking garage and the soffits above the train

tracks and the bus loading bays. All systems will discharge at high level and be sited to avoid contamination of intake air louvers.

The building will be completely sprinklered utilizing a wet system. Siamese connections will be provided at the exterior of all 3 entrances to the building adjacent to elevators.

Major electrical service rooms are proposed to be located at the basement level of the existing former TH & B building where some electrical service areas already exist. Additional space will be made available by the relocation of mechanical services for the existing building to its seventh floor. At the basement level, a diesel-fired emergency power generator will be provided to ensure uninterrupted power supply for GO Transit communications and control emergency lighting and leasable areas computer systems.

A two-stage fire alarm system will be provided with connections to the sprinkler alarm and control valves. The control and annunciator panels will be located at one of the three building entrances adjacent to elevators with remote annunciator panels at each of the remaining two entrances.

Lighting of the office levels will be via fluorescent fixtures recessed into the suspended acoustic tile ceiling. Public areas will be illuminated with a variety of means including H.I.D. fixtures integrated with exposed structural steel, surface mounted fluorescent units and recessed compact fluorescent luminaires.

Scale of Architectural Development

One of the difficult challenges of the design solution has been to reconcile the scale of new development conceived and accepted at the Architectural Programme Stage of this Thesis with the proposition that the existing former TH & B Station building must be preserved and restored. The proposed 46,000 GSM of new development is vast when compared to the 4,000 GSM of the

existing building. The extent of the proposal is, however, based on logic discussed in both the Research Report (October 1990) and the Architectural Programme Report (revised October 1991) produced for this Thesis and attached. This logic is repeated and expanded as follows.

The site area of the existing building has been expanded through the acquisition of Beckley Street from the City of Hamilton to a total site area of 17,264 SM. This site area is the minimum possible to execute the Train/Bas Station aspects of the Programme. The constraint of the site area is evident in the need to compromise GO Transit Engineering Standards. For example, buses must be backed out of loading bays.

The existing building represents a mere 0.23x site coverage of the required 17,264 SM. The "I" District (Central Business District, etc.) zoning of the subject site permits a G.F.A. equal to 11x site coverage plus bonuses for extra site area and street frontage permitting a development in excess of 315,000 SM of gross floor area. Based on this legal development capacity, the site has an inherent economic value which GO Transit and its development partner must incur in order to execute this project.

The 46,000 GSM development proposed in this Thesis represents less than 15% of the legally allowable development capacity of the site. The intent of this restraint is to achieve a scale of development which mediates between two polarized points of view. On one hand, there are those who place the highest importance on preservation of the historical integrity of the existing building. How can this building be acquired, however, to undertake preservation and restoration when those who own it value the site based on its legal capacity to support 315,000 GSM of development? Unless an economically viable scheme can be undertaken, the existing building will continue to decay (as it has for the past 15 years) to the point where there is little left to preserve.

The scale of development proposed in this Thesis has been intentionally restrained so as to not overpower and minimize the importance of the

existing landmark as well as achieve a compatibility with its urban context. It has also, however, been scaled to allow a development which hopefully will:

a. make acquisition of the subject lands financially feasible;
b. generate sufficient revenue to undertake restoration of the existing building.

Consideration for the architectural scale of the proposed design solution has also been given to building height. Again, it should be noted that the zoning bylaw will permit a maximum building height of 37.0m except that where the average angle of light obstruction does not exceed 75 degrees from the centreline of the abutting street(s), the height shall not exceed 100.00m. In the design solution, the proposed maximum building height of 26.5m has been intentionally restrained to not overpower and minimize the importance of the existing landmark. In fact, in the Hunter Street facade where the existing building addresses the street, the new structure does not exceed the height of the existing building.

Concept and Language

Having reviewed the functional and programmatic aspects of the design solution, this discussion will focus on concept and language. At the outset, it should be stated that built form existing on the site is highly symmetrical about a north-south axis aligned on Hughson Street, and that two stylistic languages are evident. The first of these is the 1933 streamlined Art Moderne expression of the former TH & B station. The second is the structurally expressive engineering construction of the steel-framed platform canopies, bridges and concrete retaining walls. It is significant to note that the latter two elements are evident in the existing urban fabric for several blocks both east and west of the specific project site.

Several decisions dominated the conceptual development of the proposed Hamilton GO Transit Station. First, it was determined to develop new construction in a structurally expressive functional manner in keeping with one of the two existing languages. This would enable the existing former TH & B building to stand on its own as a clear historical statement. New

construction was configured to physically engage the existing building as little as possible.

Secondly, in order to not visually overpower the Art Moderne building, and to accentuate its symbolic and functional significance, new construction was conceived to extend and complement the existing symmetrical composition. The component elements have been arranged in volumes which dimensionally complement the existing. The scale of development has been manipulated to resolve the visual duality of the familiar "wedding cake" profile. Also evident is an attempt to capitalize on the interlocking volume approach commonly seen in cubist influenced architecture - a family to which the TH & B building clearly belongs.

Other symbolic gestures play important roles in the conceptual approach. One idea is the great historical glass-enclosed train shed re-interpreted as a late twentieth century modern atrium. The "shed" in this case is internalized, protecting only the passengers, and is, therefore, concealed within the building expressing itself at the ends, top and bottom, and emerging in familiar double-gambrel geometry at the centre. This forms a "niche" in which the TH &B building is "displayed" and made visible from the interior of the Station.

Another concept is that of bridging spans - an element commonly associated with railway imagery. The office modules span space bridging between the eight service towers and over the tracks. The structural concept of new bridges over John and James Streets is a familiar historical motif, and one which is re-interpreted in the expression of structure supporting the office levels and atrium.

Lastly, the complex has been designed to balance the idea of the trains "entering" the structure while at the same time maintaining their visibility from the exterior. This approach preserves the exterior functional expression of the building (i.e. dynamic activity of arrival and departure), while suggesting the enclosure of the trains (i.e. romantic historical recollection).

DEFENSE OF THE THESIS PROPOSITION

1. The proposed design solution is unlike any suburban station in the GO Transit system. There is no large free parking lot, and no windswept unprotected platforms. The provision of shopping and workplace opportunities, interfacing with municipal transit, and integration with pedestrian systems, are intended to support the idea of the Hamilton Station as a destination rather than an origin for commuters.

2. Within any urban structure, economic activity is greater along major paths of movement and greatest at their intersection. One need only examine the locations of nodes of intense development and their relationship to subway stations in Toronto to defend this proposition. Another perhaps more relevant example is the development of Toronto's financial district in proximity to Union Station, which is the major terminus for GO Transit commuters.

   Economic growth in the vicinity of the Hamilton Station will occur even if the commercial component of the project is deleted. In fact, economic growth is already occurring in anticipation of the station before it is built.

   The commercial component of the thesis project is intended to accelerate the process - that is to act as a catalyst through demonstration of the possibilities.

3. The design solution has integrated GO Trains, GO Bus and other Inter-regional Bus Carriers at one location. It has also interfaced with the municipal bus system at three locations. A true intermodal station permitting connections between a labyrinth of origins and destinations has been created.

4. If people commute to work, shop, and be entertained in Hamilton rather than Toronto, from Guelph, Oakville, Cambridge, Brantford, Burlington

and Niagara, the time, cost and energy expended in travel will decrease. This will increase people's time for more meaningful activities (social benefit), reduce their travel expenses and housing costs, as well as provide more affordable commercial spaces for business (economic benefits), and create less pollution while using less energy (environmental benefits).

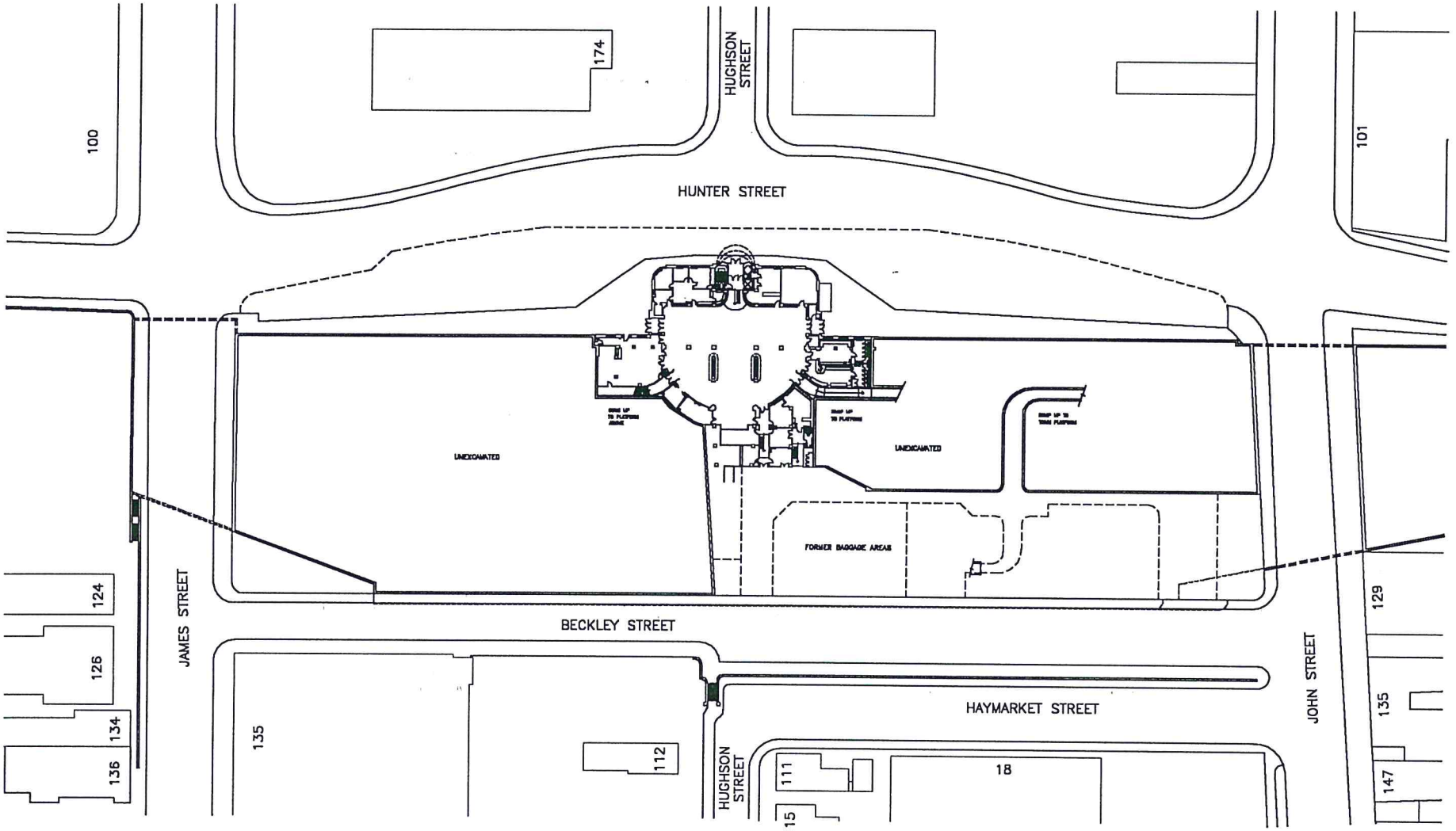
The proposed design solution will support this pattern of movement. The creation of required transit schedules is necessary to complete the vision.

5. Available parking has been restricted to 286 spaces. It is believed that if it is more convenient to take the bus or train than drive a car, commuters will do so. The response of planners when confronted with traffic congestion is often to require more parking, and widen streets. This, like opening a faucet, only increases the flow.

   Also, and more importantly, if we accept the argument that the Hamilton Station should be a destination rather than origin for commuters, there should be little need for parking. Those wishing to commute to Toronto by car connecting to bus or train should use major highways rather than city streets, and drive to the Aldershot Station in Burlington, where plenty of free parking will be available.

6. The existing former TH & B Station has been preserved and restored - its historical and cultural significance intact. As we adapt an old technology (train travel) to serve a new purpose (commuting), it is important that we retain the historical elements associated with that technology.

7. Natural light, weather-protected climate-controlled environments, convenient connections to services, workplaces and other modes of transportation, as well as the infusion of interest, activity and excitement will all combine to make commuting by public transportation a more attractive alternative than is currently available. The cost will be high, but the return on investment through improved environmental quality will justify the expense.



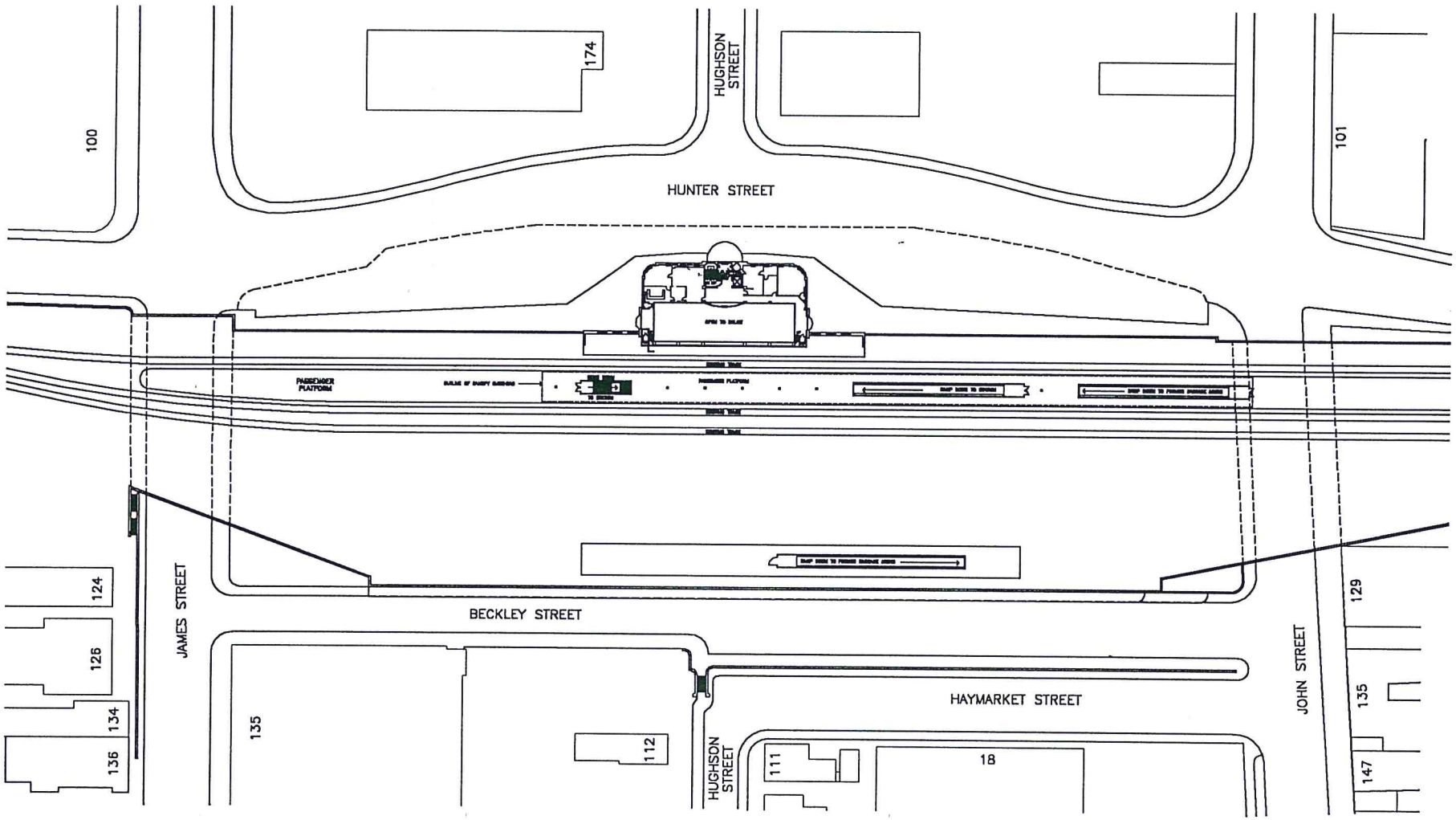
HAMILTON STATION

TRANSIT

EXISTING CONDITIONS
FORMER T.H.& B. STATION
SITE PLAN AT STREET LEVEL

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS

JUNE 1990



HAMILTON STATION

GO TRANSIT

EXISTING CONDITIONS
FORMER T.H.& B. STATION
SITE PLAN AT TRACK LEVEL

0 3 9 18 30
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS

JUNE 1990

EXPLANATORY MATERIAL REGARDING SURROUNDING AREA
LOOKING SOUTHWEST NEAR HUGHSON & HUNTER

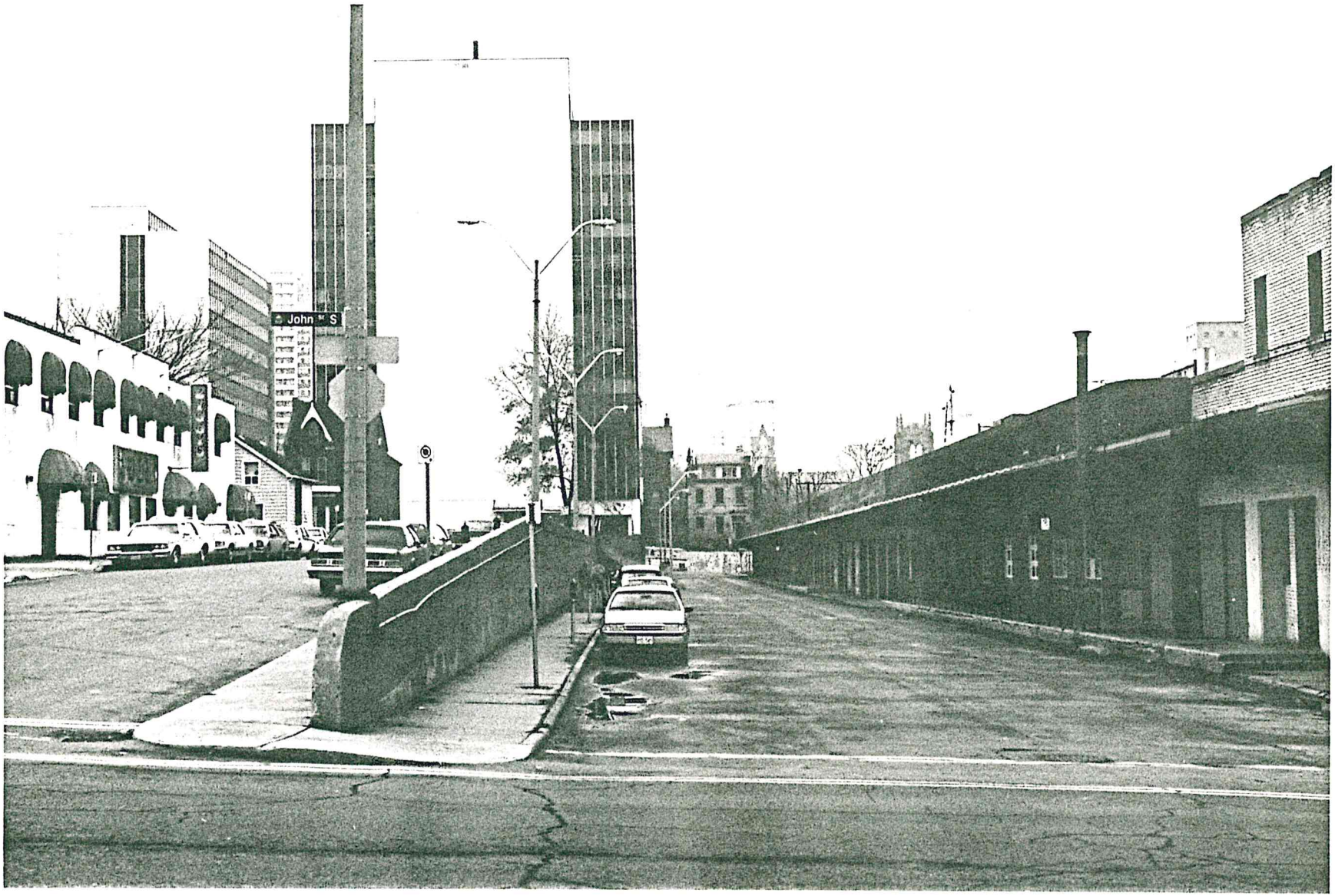
EXPLANATORY MATERIAL REGARDING SURROUNDING AREA
LOOKING SOUTH NEAR JAMES & JACKSON

EXPLANATORY MATERIAL REGARDING SURROUNDING AREA
LOOKING SOUTH AT JAMES & BECKLEY

EXPLANATORY MATERIAL REGARDING SURROUNDING AREA
LOOKING NORTH FROM JAMES & DUKE

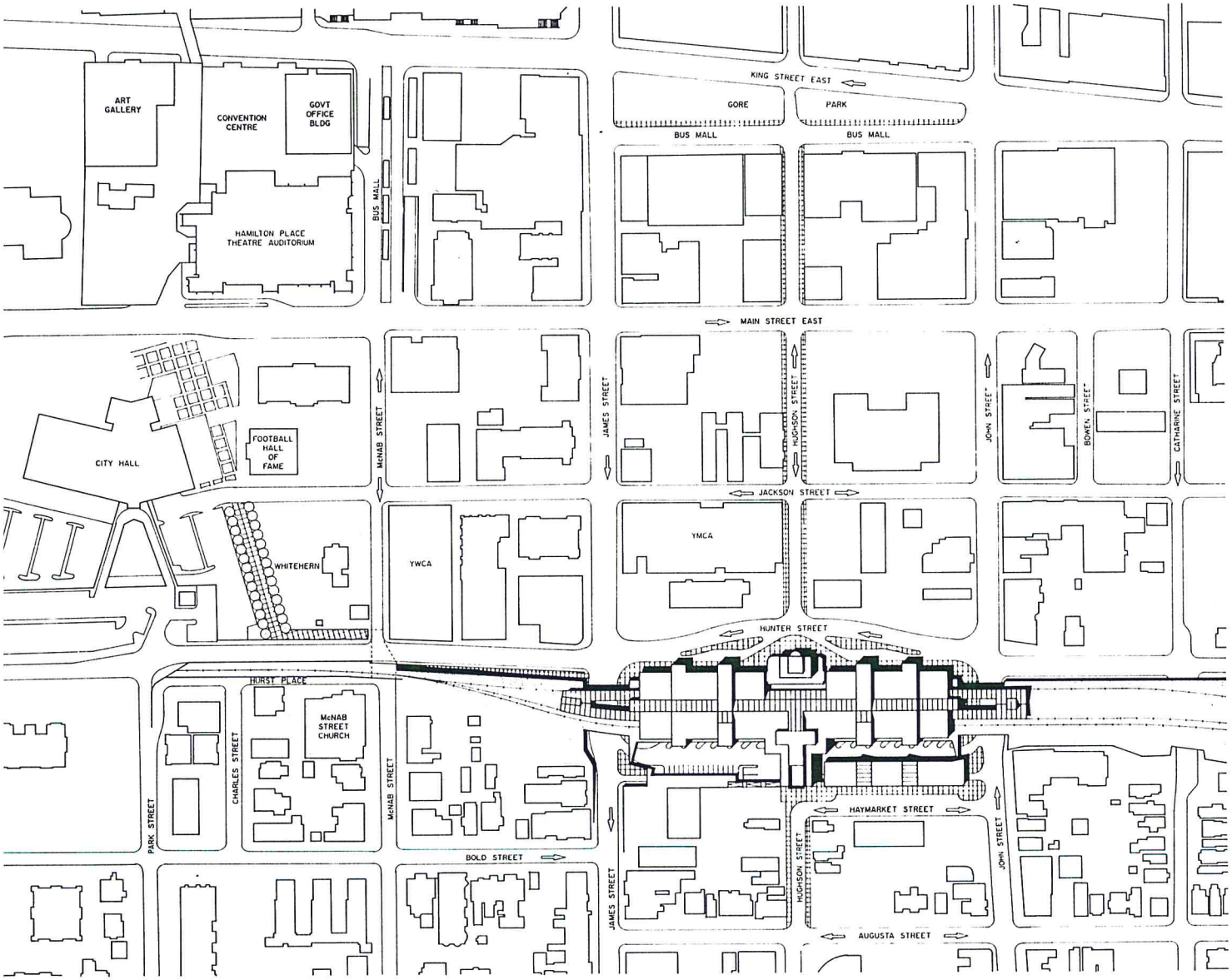
EXPLANATORY MATERIAL REGARDING SURROUNDING AREA
LOOKING NORTH FROM HUGHSON & AUGUSTA

EXPLANATORY MATERIAL REGARDING SURROUNDING AREA
LOOKING NORTHWEST NEAR JOHN & HAYMARKET



EXPLANATORY MATERIAL REGARDING SURROUNDING AREA
LOOKING WEST AT JOHN & HAYMARKET

EXPLANATORY MATERIAL REGARDING SURROUNDING AREA
LOOKING WEST AT JOHN & HUNTER



HAMILTON STATION

GO TRANSIT

THESIS PROPOSITION

1. The Hamilton GO Station should not be another suburban station serving Toronto and increasing the dimension of its commutershed.

2. The Hamilton Station presents an opportunity to act as an economic growth nucleus for downtown Hamilton through the concept of a mixed use commercial development integrated with a transit centre.

3. It is desirable to consolidate GO Train and GO Bus service in Hamilton to the same location integrating other inter-regional Bus Carriers currently sharing facilities elsewhere in the City. It is also desirable to interface with municipal bus service (Hamilton Street Railway), thereby creating a true intermodal station which has been demonstrated to be a current theoretical concept of the building type in question.

4. The Hamilton Station should accept commuters from its own environs, e.g. Guelph, Oakville, Cambridge, Brantford, Burlington and possibly Niagara in the morning and return them in the evening. On a smaller scale, the Hamilton Station should do for Hamilton what Union Station does for Toronto. This is desirable on the basis of social, economic and environmental objectives.

5. Parking should be minimized at the Hamilton Station in order to encourage use of public transit, reduce traffic congestion within the urban core, avoid the expenditure of valuable lands for vehicle storage, and reinforce the objective that the Station should not serve Toronto.

6. The existing former Toronto Hamilton and Buffalo Railway Station building which occupies part of the site has been demonstrated to be of historical and cultural significance. Since publication of the Research Report for this thesis, the building has been designated for protection under the Federal Heritage Railway Stations Protection Act. The programme for this thesis will include preservation and restoration of the existing station as well as integration of it into the new mixed use project. Again, this is a current theoretical concept associated with this building type.

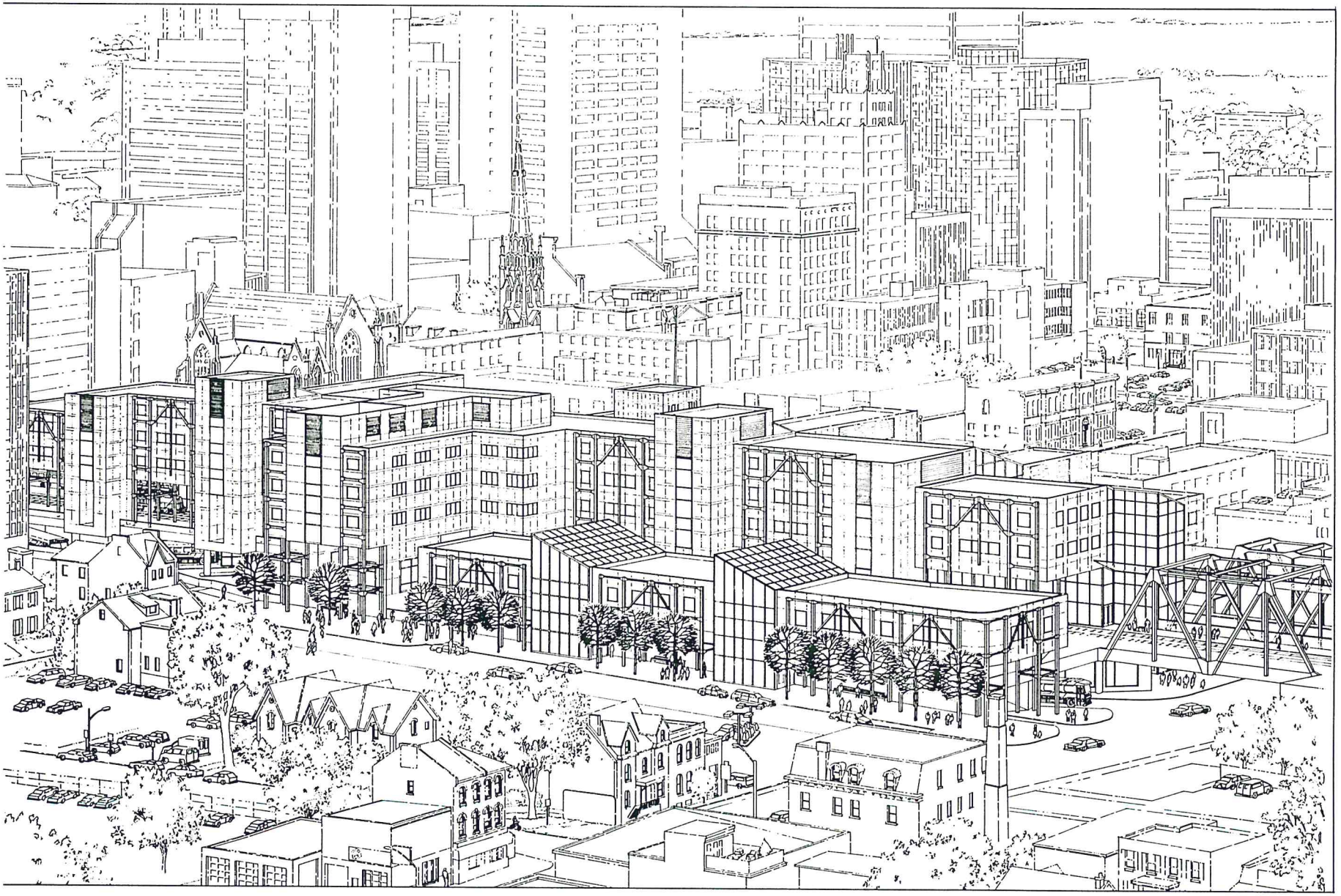
7. Architectural design through the application of the best possible technology is an effective tool to increase use of public transportation by creating convenient, comfortable and exciting transit stations. This will require a socio-political commitment to properly fund such projects on the basis of improved environmental quality as society's return on investment.

CONTEXT PLAN

DECEMBER 1992

0 10 30 60 100
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



URBAN INSERTION

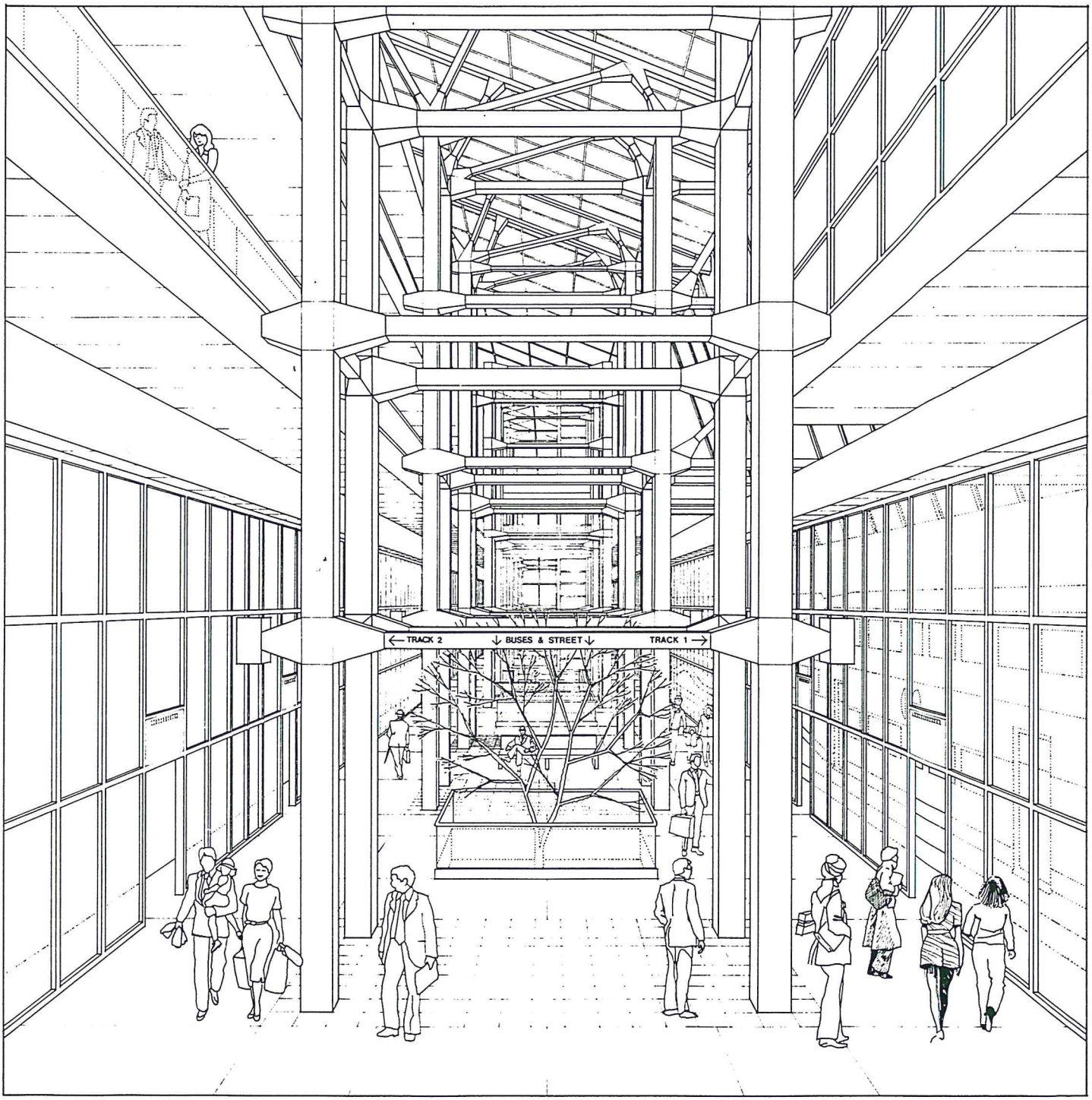
RANSIT

HAMILTON
STATION

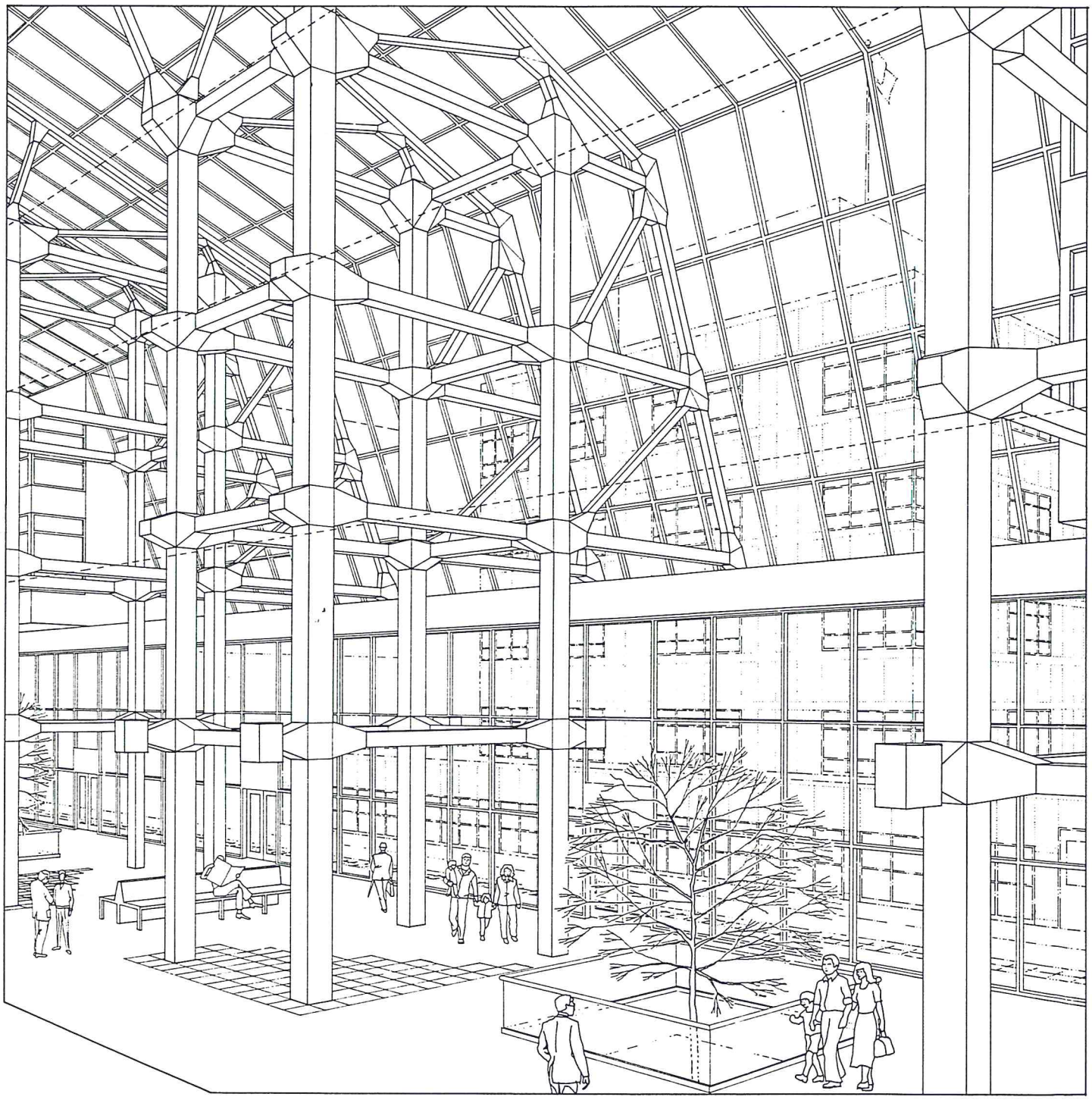
PERSPECTIVE

DECEMBER 1992

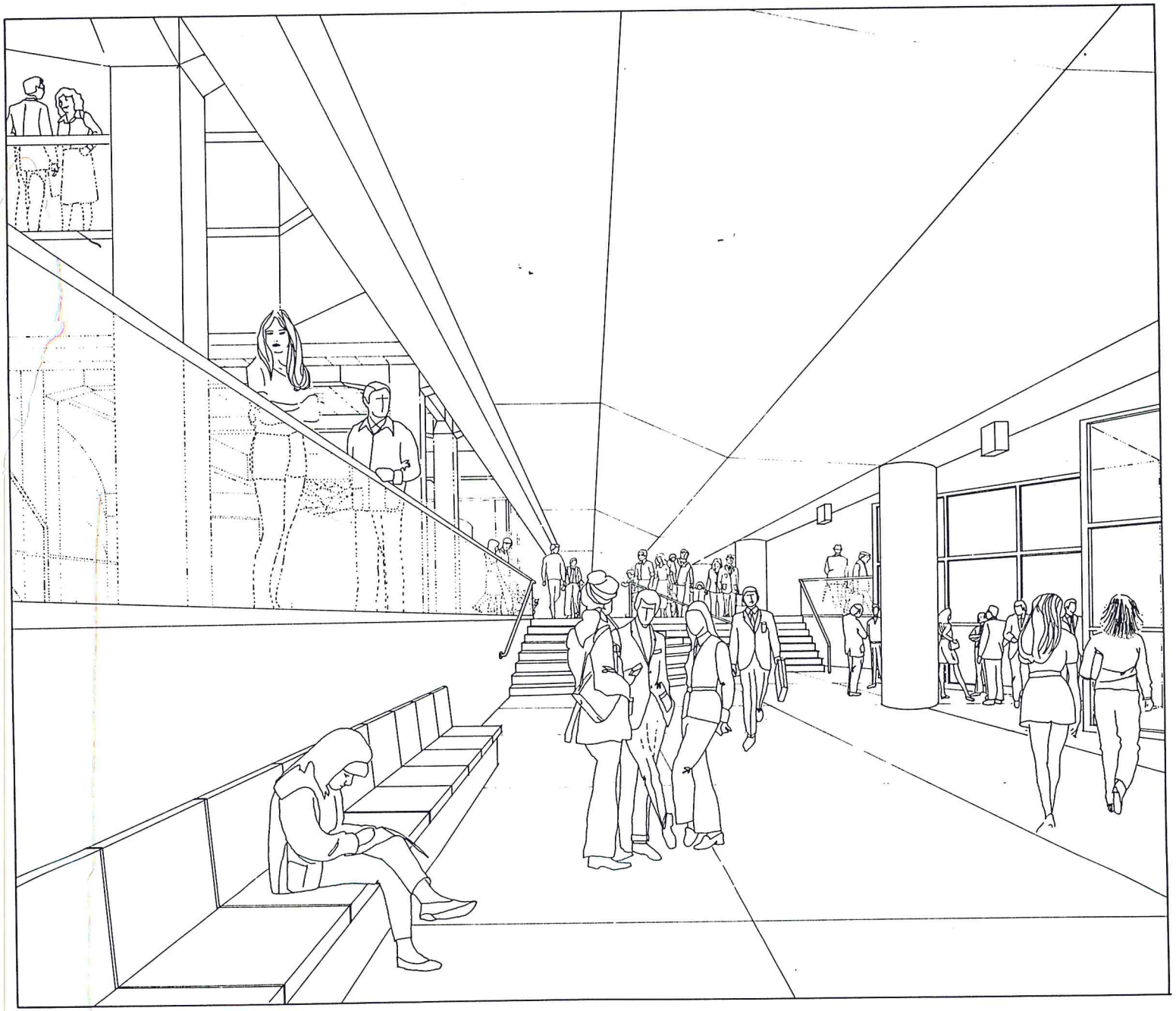
ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



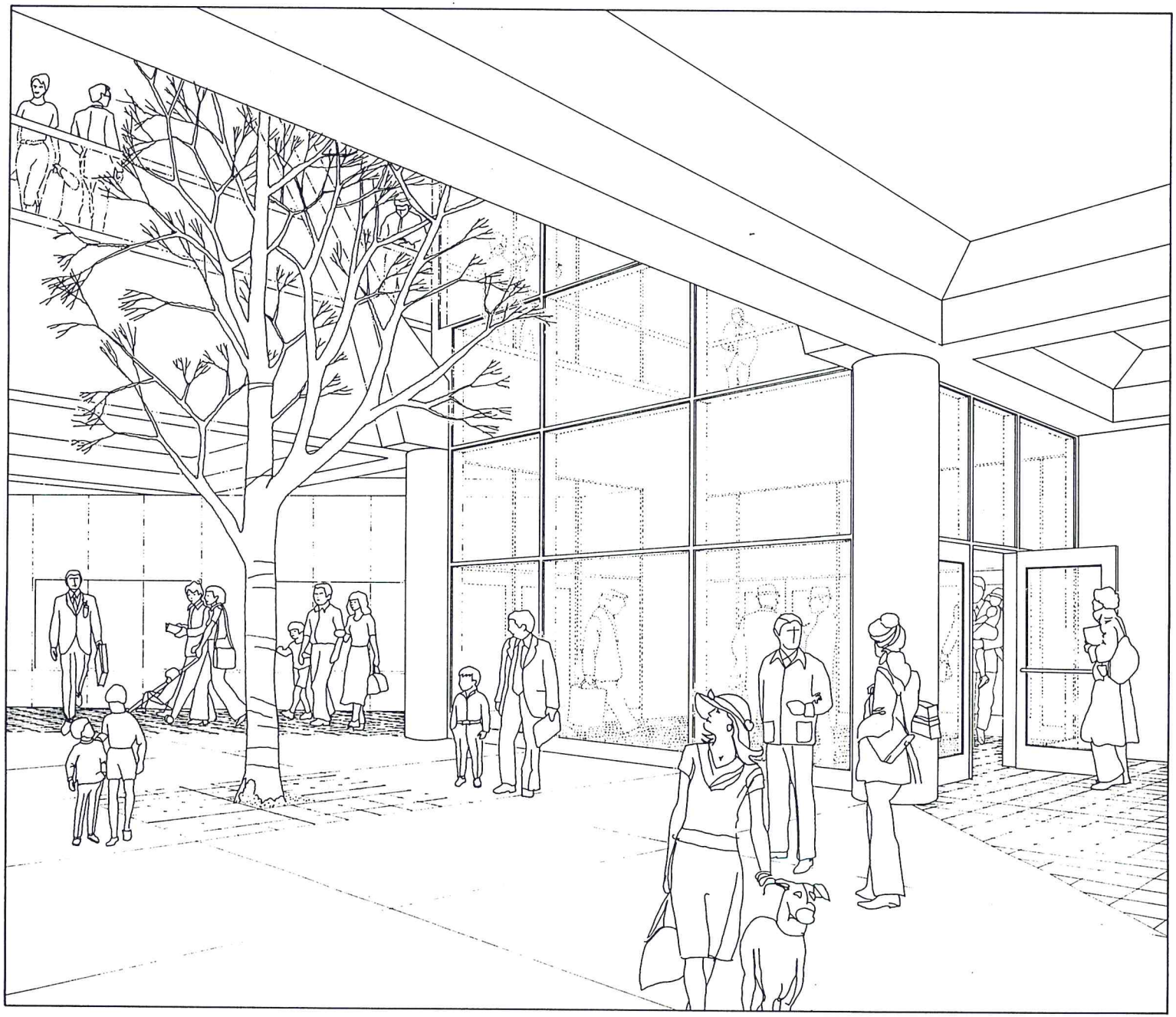
ATRIUM & TRAIN PLATFORM LOOKING WEST



EXISTING BUILDING SEEN FROM ATRIUM/TRAIN PLATFORM

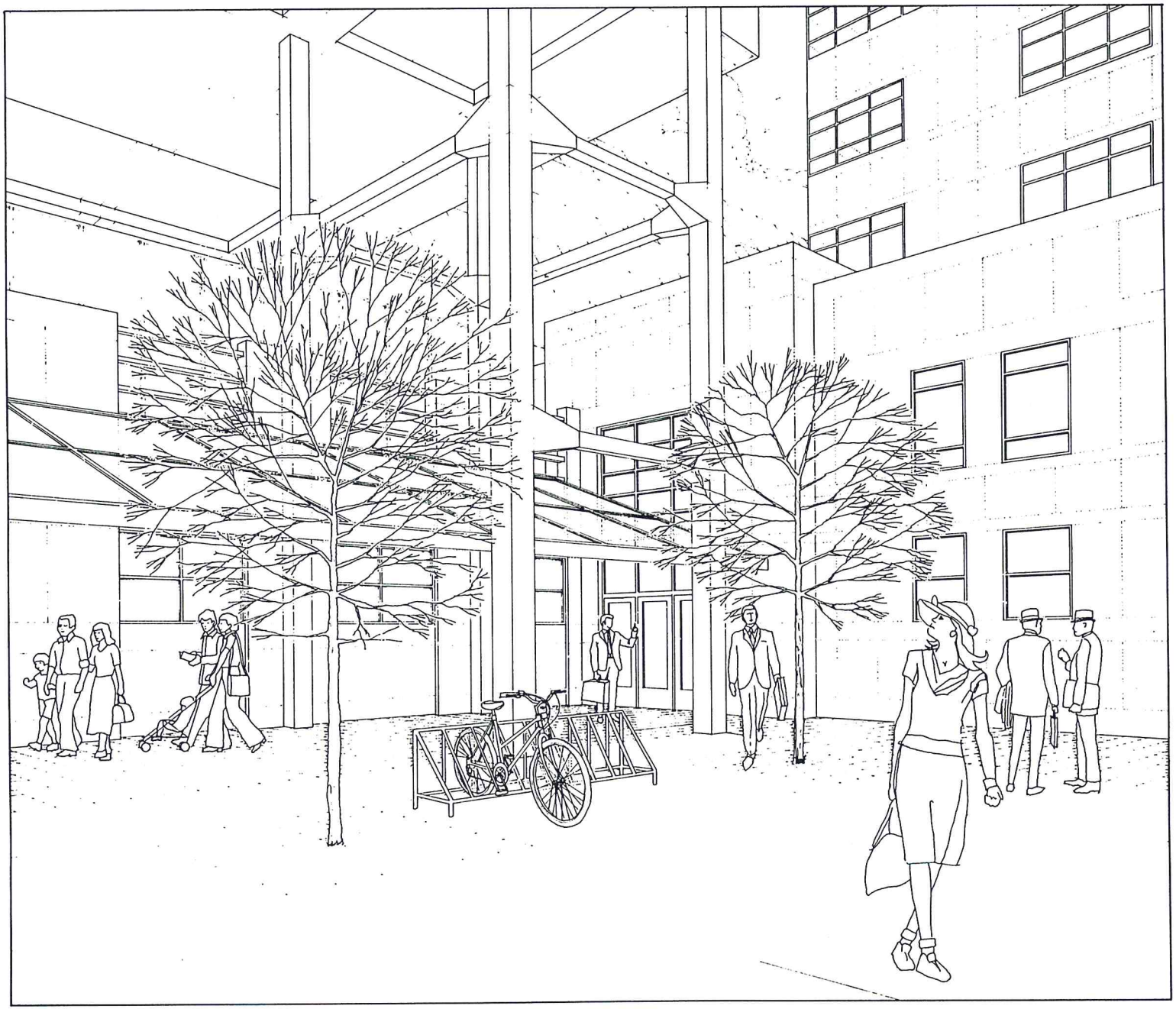


BUS PLATFORM AT EXISTING BUILDING

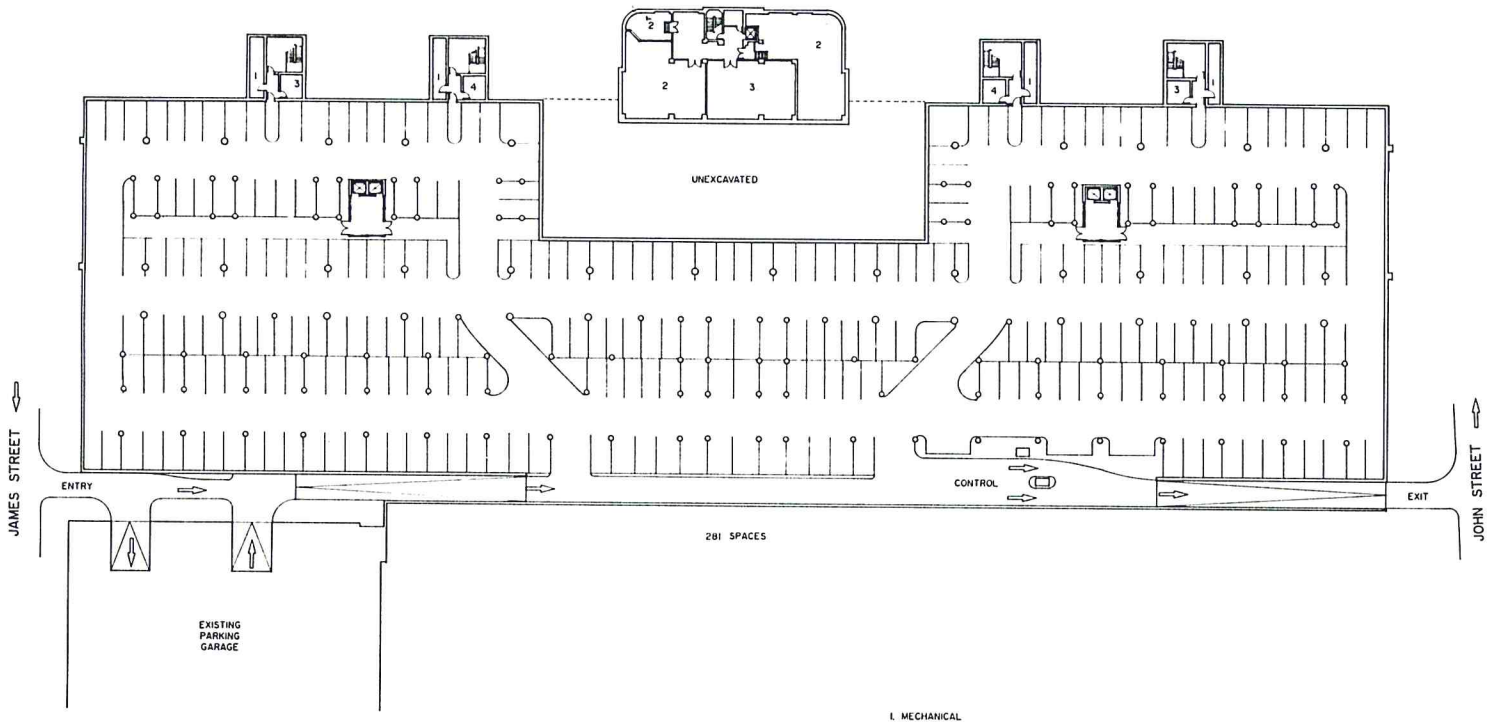


JOHN STREET ENTRANCE

HUNTER STREET ARCADE



EXISTING STATION EAST ENTRANCE



1. MECHANICAL
2. ELECTRICAL
3. STORAGE
4. ELEVATOR MACHINE ROOM

0 3 9 18 30
metres

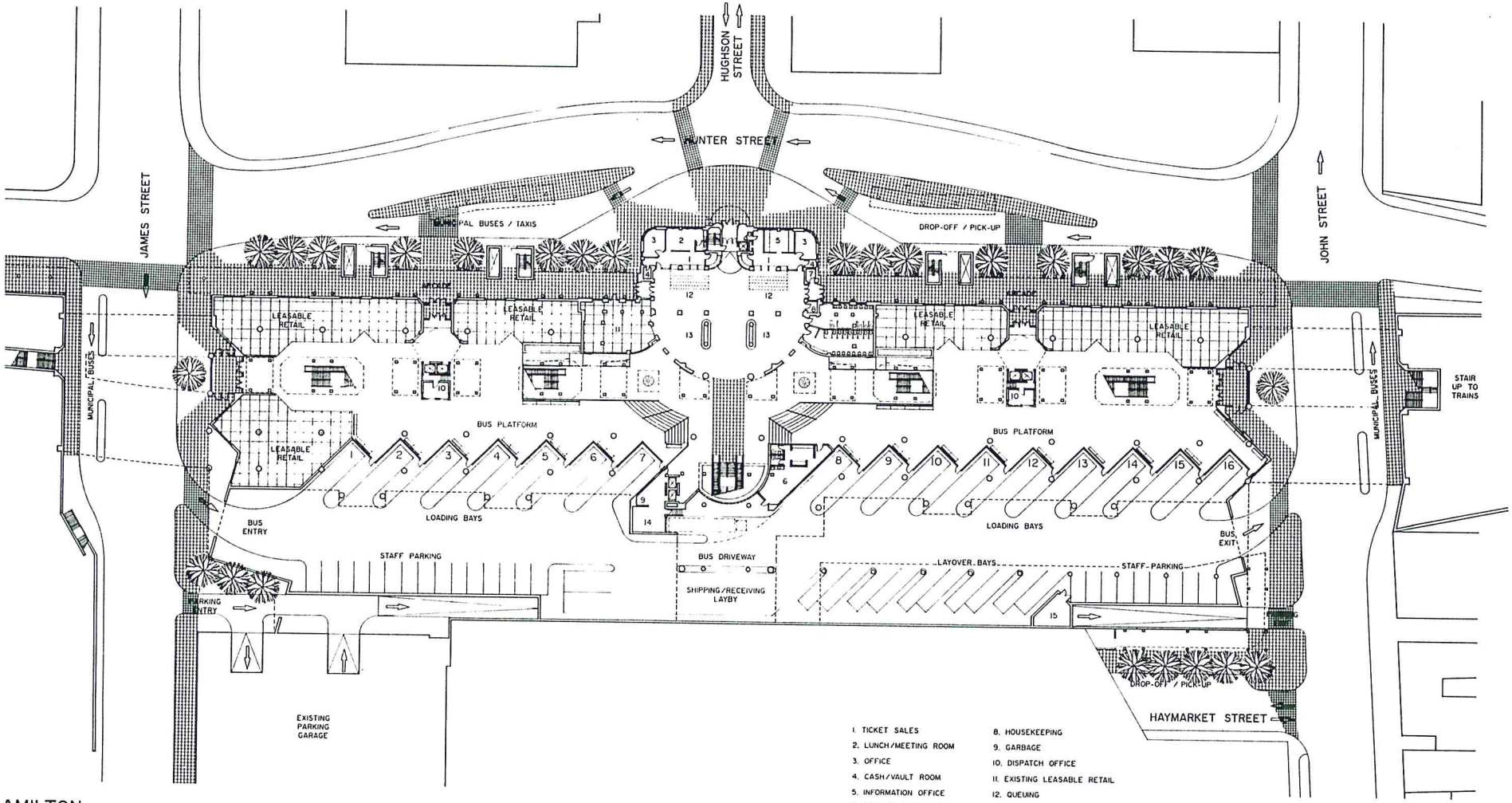
TRANSIT

HAMILTON
STATION

PARKING LEVEL PLAN

DECEMBER 1992

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



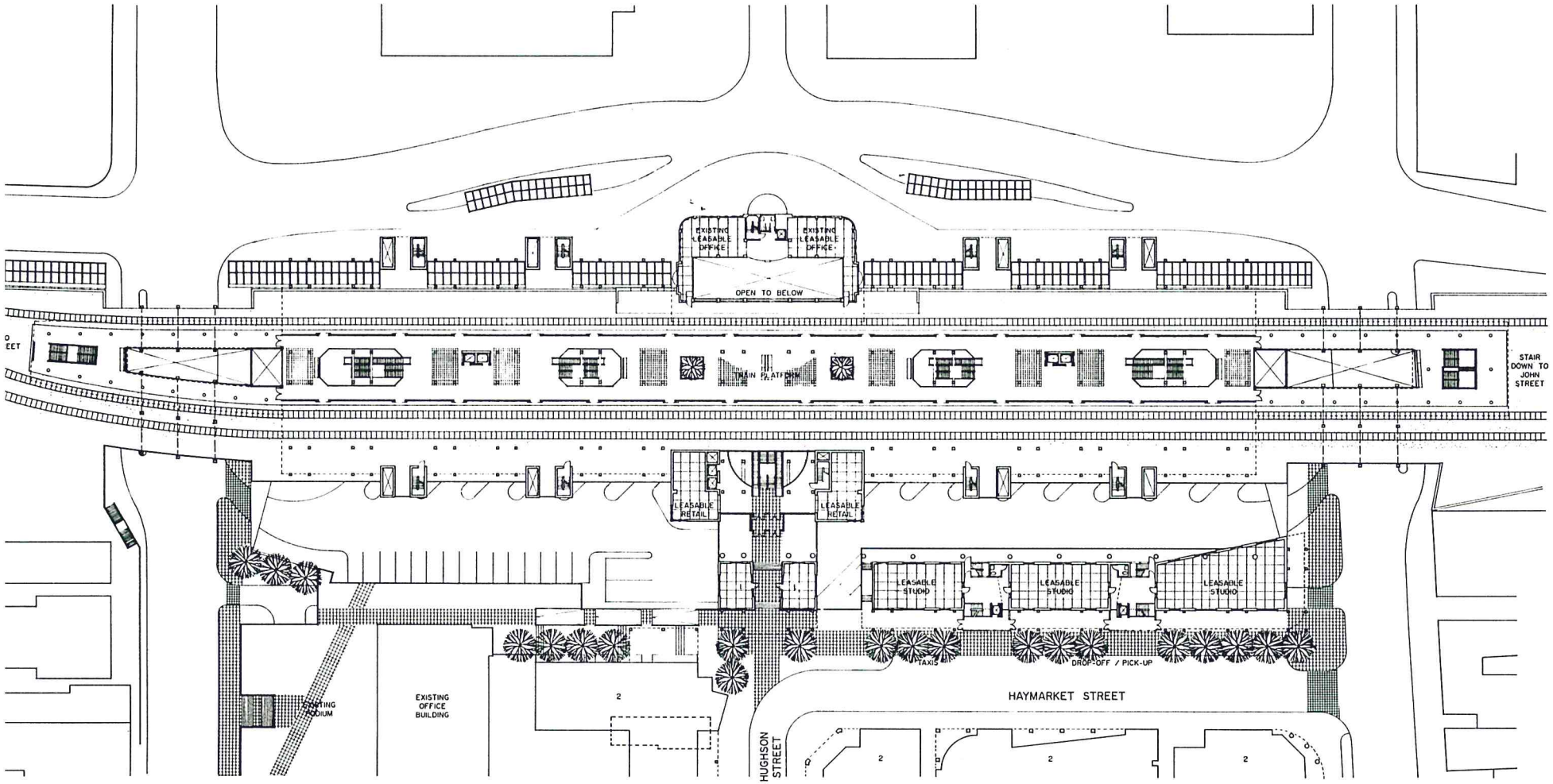
AMILTON
STATION

RANSIT

MAIN LEVEL PLAN

DECEMBER 1992

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



HAMILTON STATION

TRANSIT

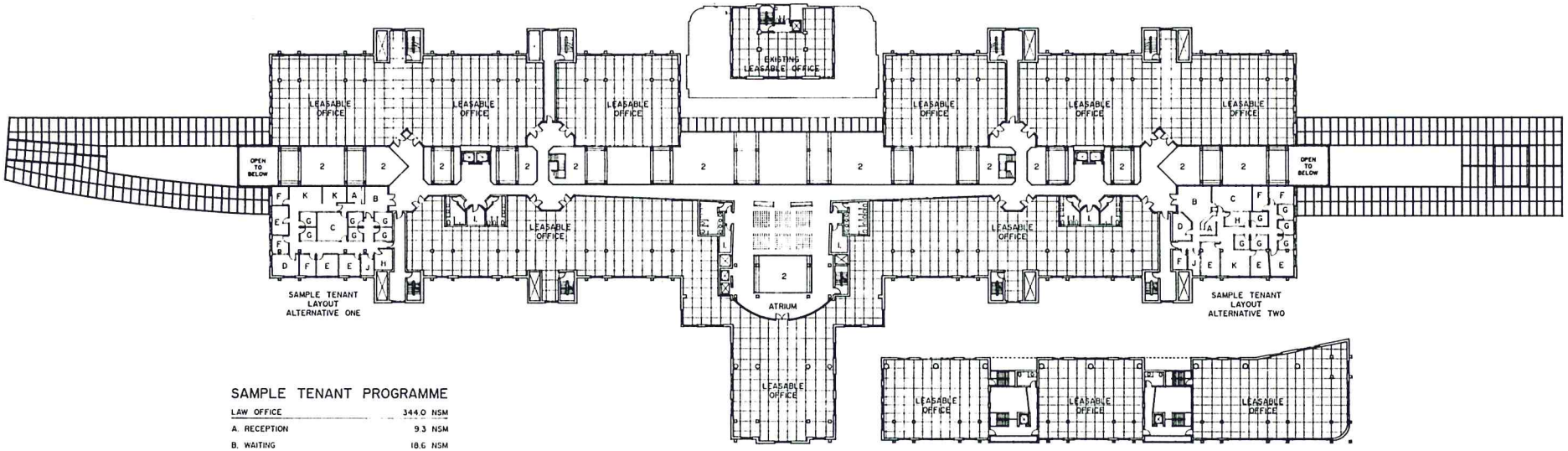
TRACK LEVEL PLAN

DECEMBER 1992

1. LEASABLE RETAIL
2. POSSIBLE FUTURE COMMERCIAL DEVELOPMENT

0 3 9 18 30
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



SAMPLE TENANT PROGRAMME

LAW OFFICE	344.0 NSM
A. RECEPTION	9.3 NSM
B. WAITING	18.6 NSM
C. LARGE CONFERENCE ROOM	27.9 NSM
D. SMALL CONFERENCE ROOM	16.3 NSM
E. LARGE OFFICE (3)	13.9 NSM
F. OFFICE (3)	9.3 NSM
G. SMALL OFFICE (6)	7.0 NSM
H. LIBRARY	11.6 NSM
J. STORAGE	8.4 NSM
K. SECRETARIAL AREA	27.9 NSM
TOTAL NET PROGRAMME AREA	232.6 NSM

HAMILTON STATION

TRANSIT

FIRST OFFICE LEVEL PLAN

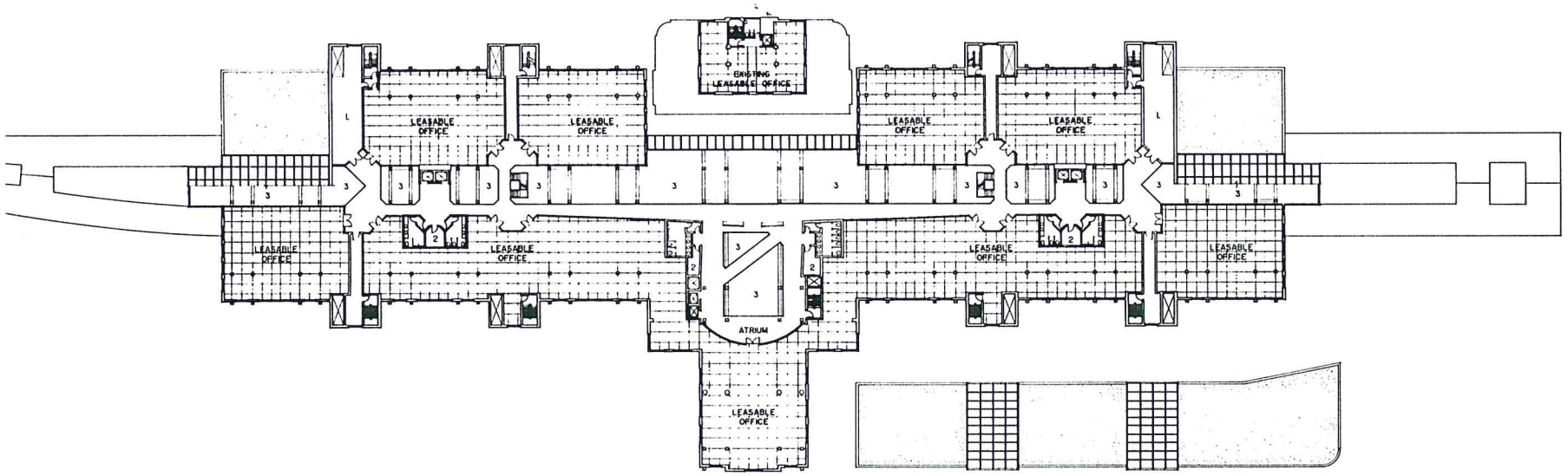
DECEMBER 1992

L HOUSEKEEPING

2. OPEN TO BELOW

0 3 9 18 30 metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



_TON
TION

NSIT

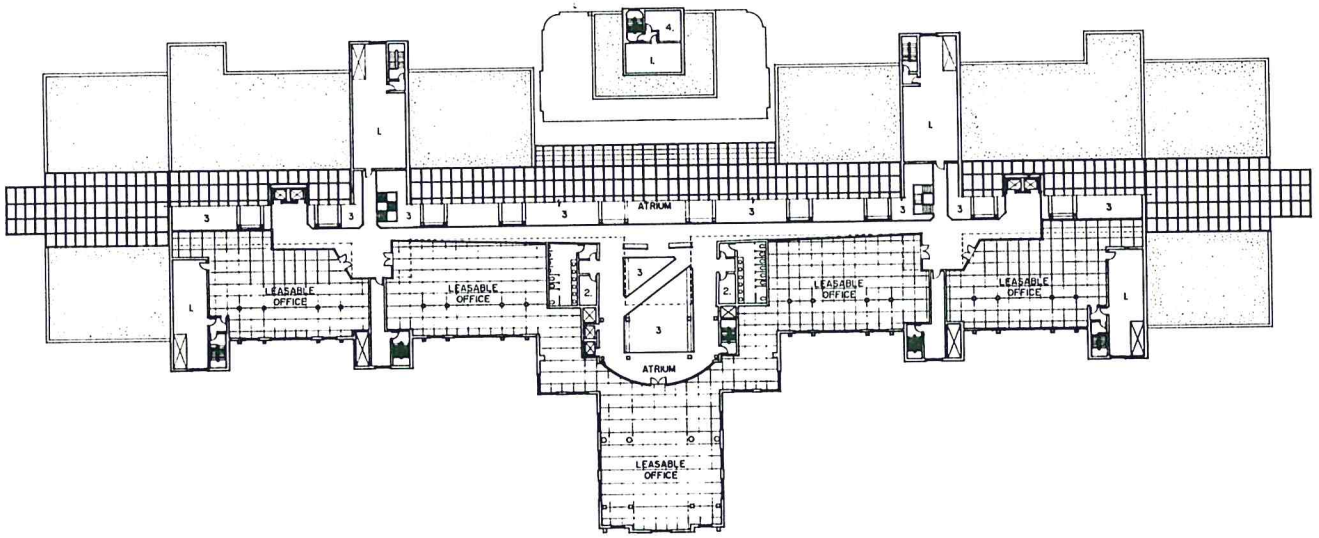
SECOND OFFICE LEVEL PLAN

DECEMBER 1992

1. MECHANICAL
2. HOUSEKEEPING
3. OPEN TO BELOW

0 3 9 18 30
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



HAMILTON STATION

TRANSIT

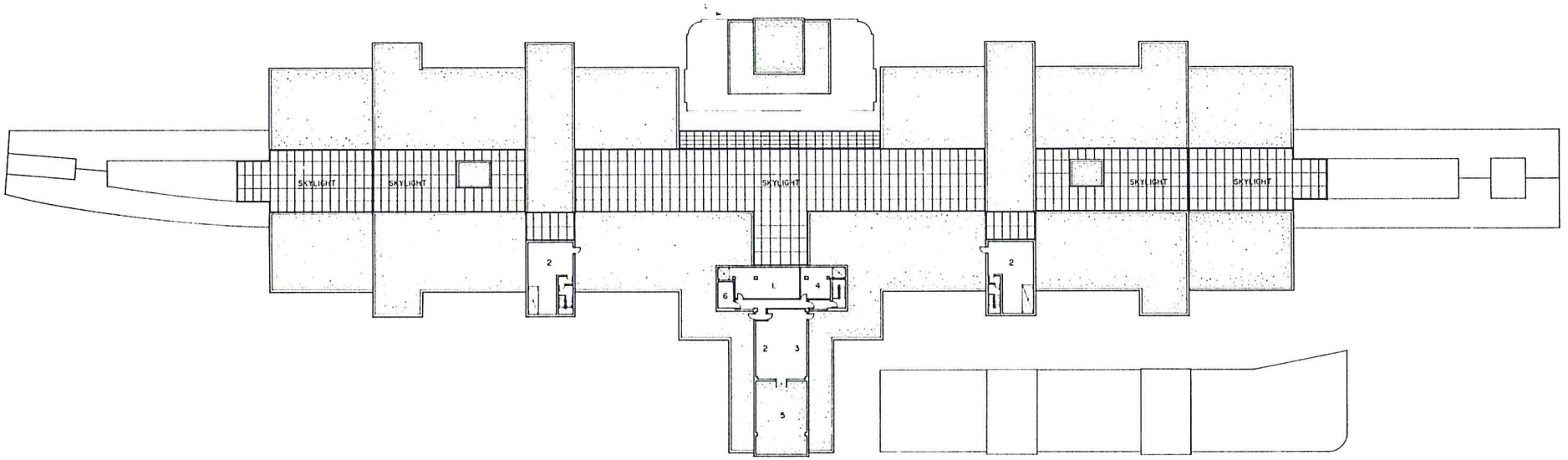
THIRD OFFICE LEVEL PLAN

DECEMBER 1992

1. MECHANICAL
2. HOUSEKEEPING
3. OPEN TO BELOW
4. ELEVATOR MACHINE

0 3 9 18 30
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



HAMILTON
STATION

TRANSIT

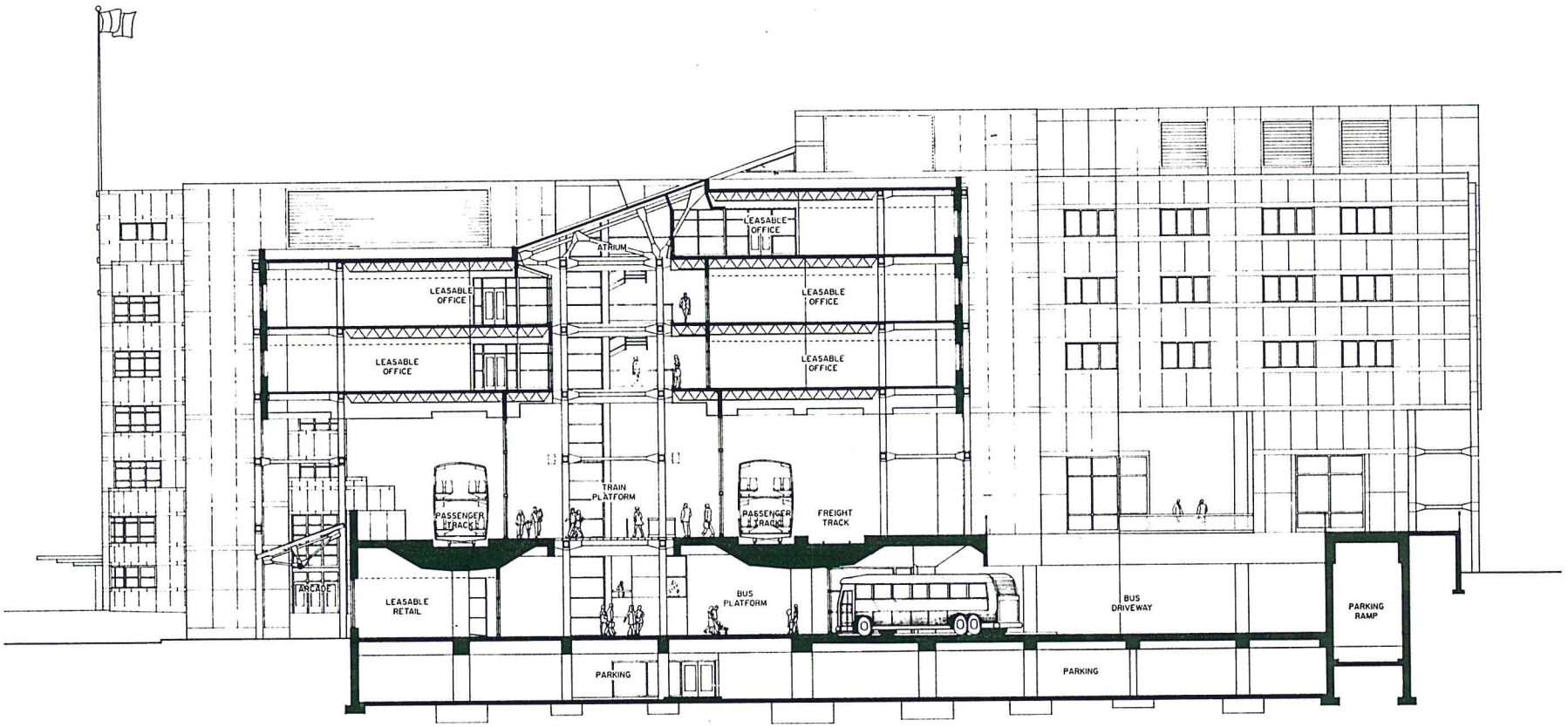
MECHANICAL PENTHOUSE & ROOF PLAN

DECEMBER 1992

1. BOILERS
2. AIR HANDLING UNITS
3. CHILLERS
4. EXHAUST FAN
5. COOLING TOWERS
6. ELEVATOR MACHINE

0 3 9 18 30
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



MILTON
ATION

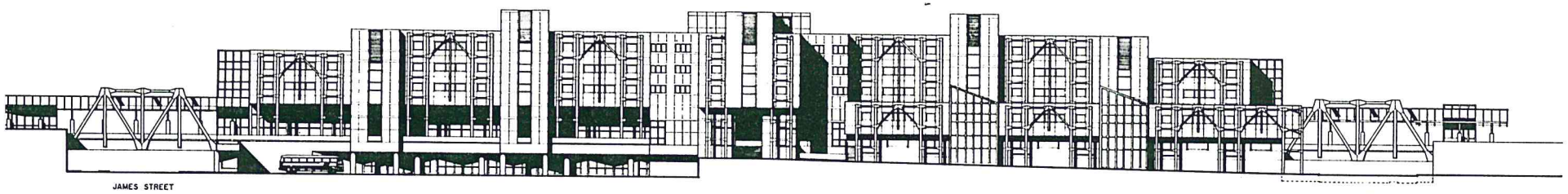
ANSIT

SECTION

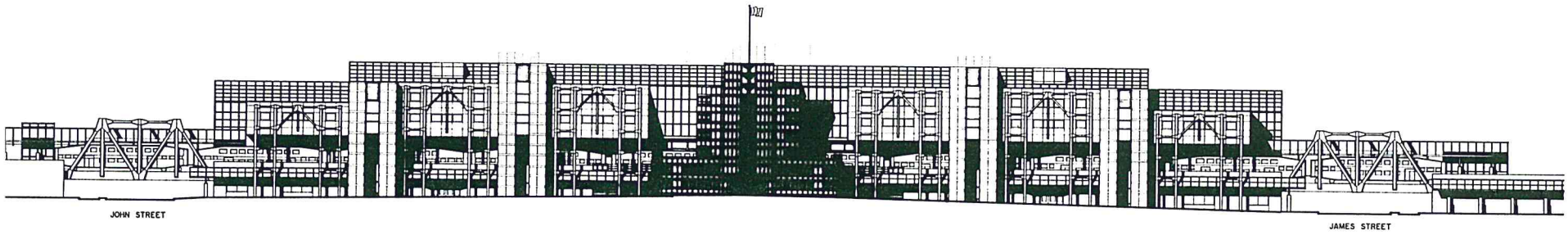
DECEMBER 1992

0 1 3 6 10
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



SOUTH ELEVATION



NORTH ELEVATION

HAMILTON
STATION

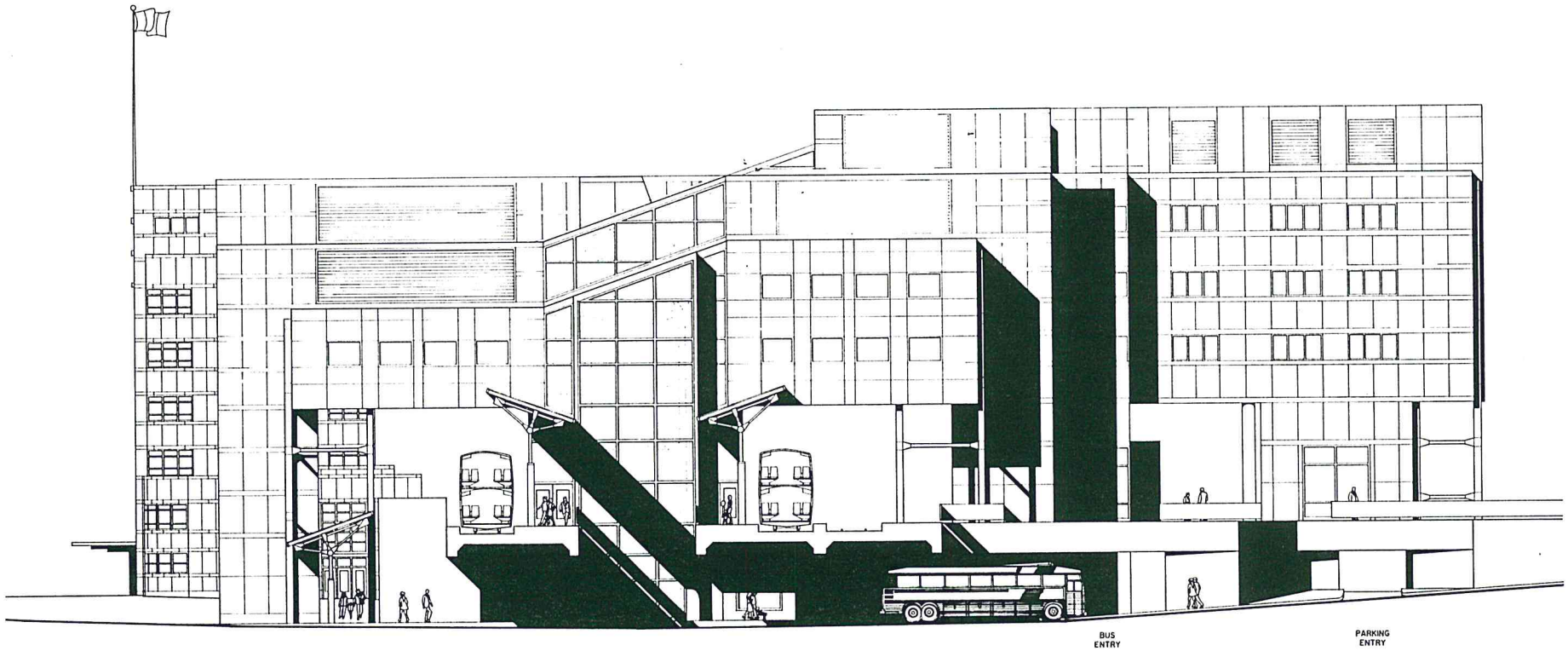
TRANSIT

ELEVATIONS

DECEMBER 1992

0 3 9 18 30
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



HAMILTON
STATION

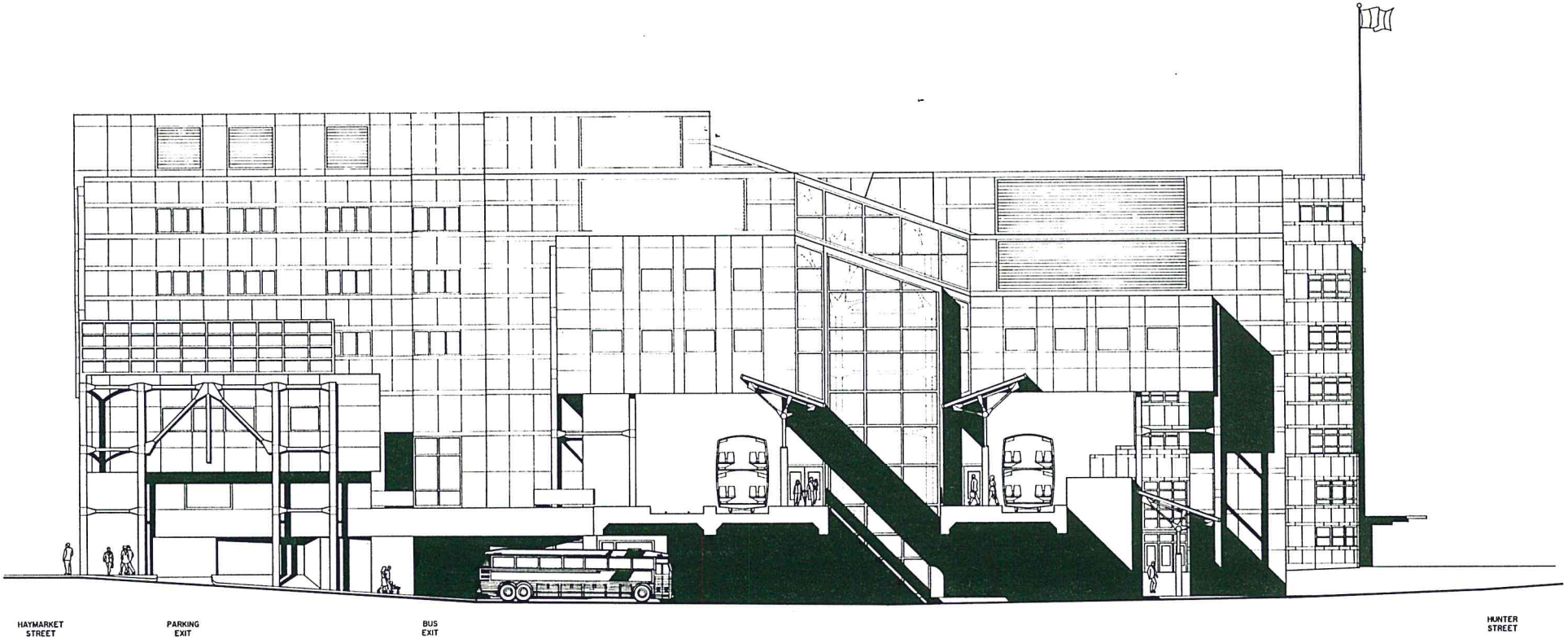
TRANSIT

WEST ELEVATION

DECEMBER 1992

0 1 3 6 10
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



HAMILTON STATION

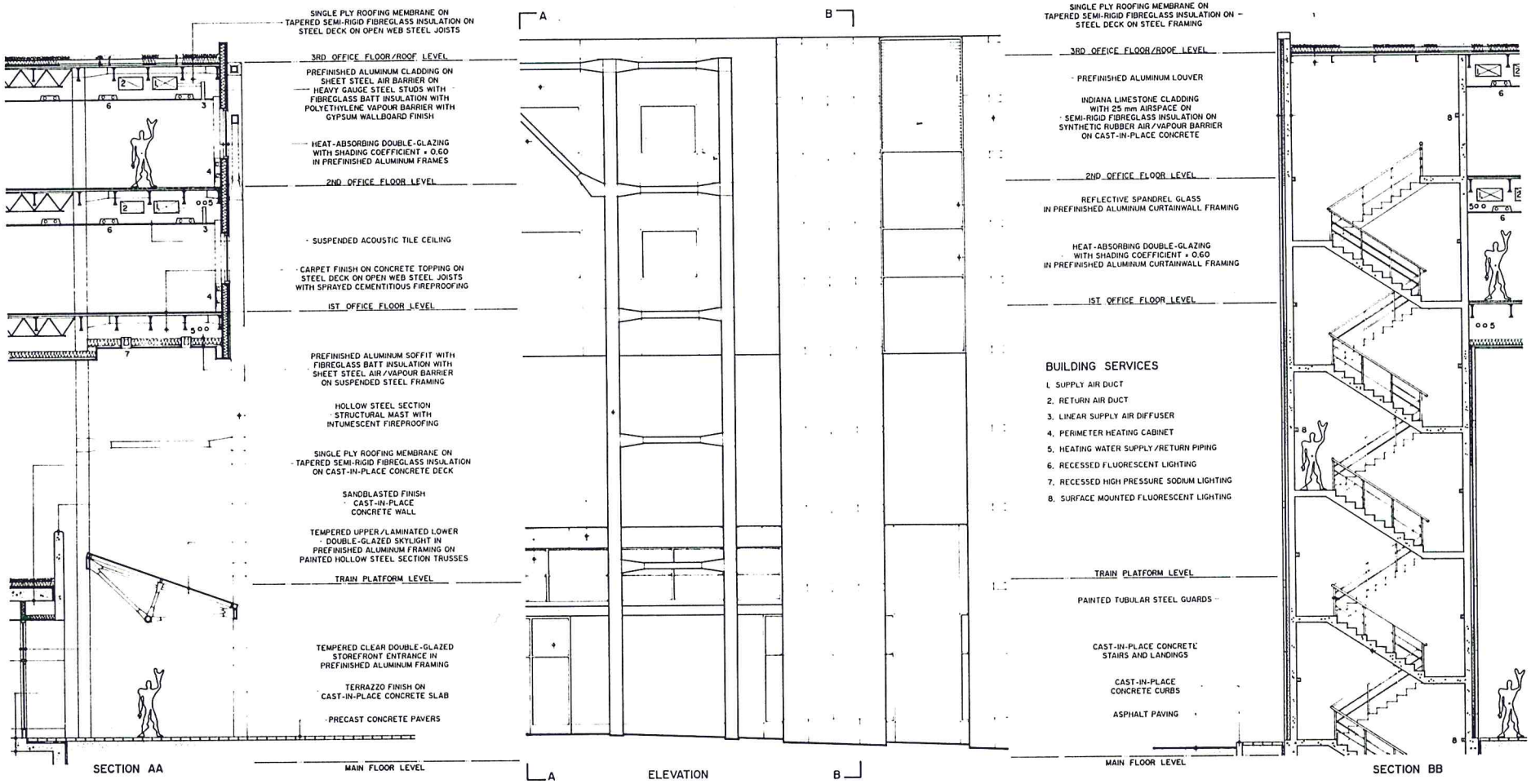
GO TRANSIT

EAST ELEVATION

DECEMBER 1992

0 1 3 6 10 metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



HAMILTON STATION

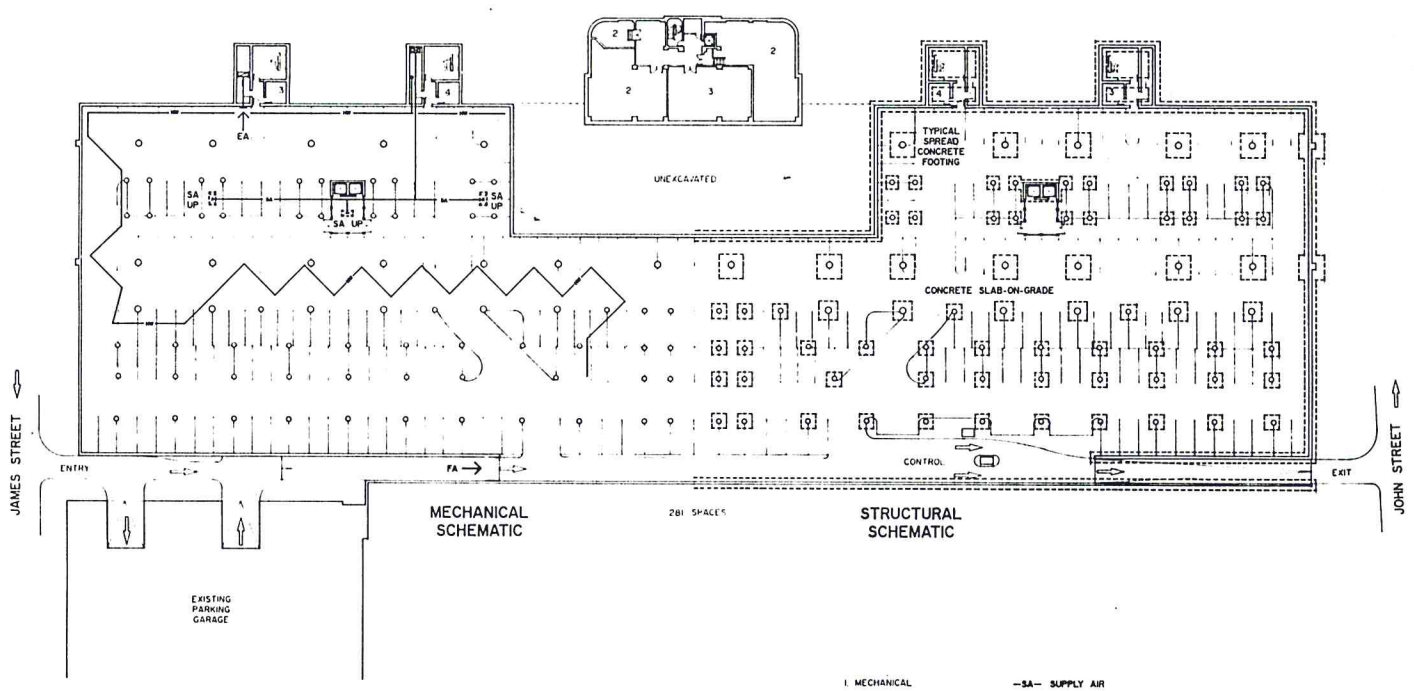
TRANSIT

SECTIONS/ELEVATION REPRESENTATIVE BAY

DECEMBER 1992

0 0.5 1.5 3.0 5.0 metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



1. MECHANICAL
2. ELECTRICAL
3. STORAGE
4. ELEVATOR MACHINE ROOM

—SA— SUPPLY AIR
—FA— FRESH AIR
—EA— EXHAUST AIR
—HW— HEATING WATER

0 3 9 18 30
metres

TRANSIT

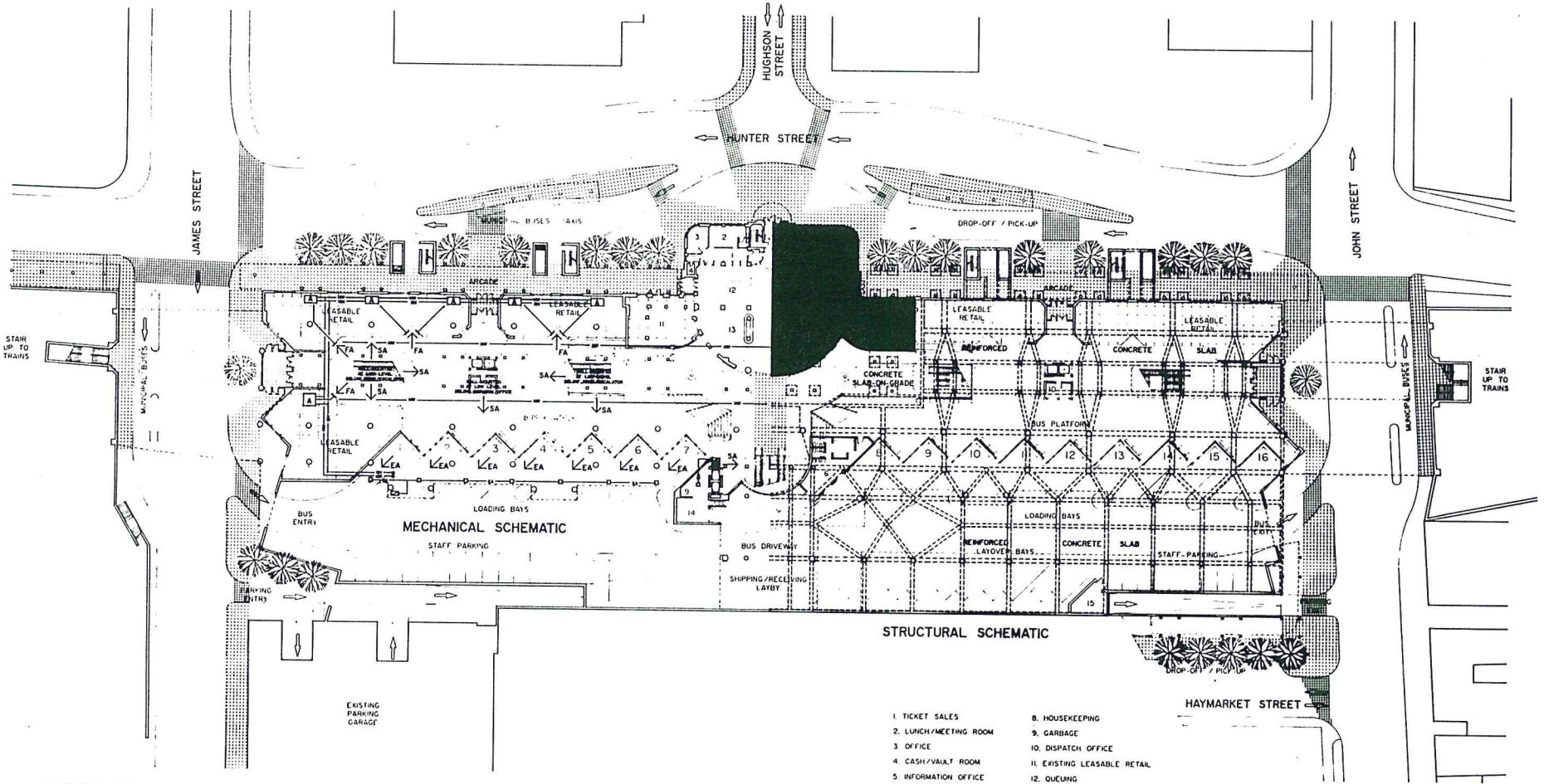
HAMILTON STATION

STRUCTURAL / MECHANICAL SCHEMATICS

PARKING LEVEL PLAN

DECEMBER 1992

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



1. TICKET SALES
2. LUNCH/MEETING ROOM
3. OFFICE
4. CASH/VAULT ROOM
5. INFORMATION OFFICE
6. DRIVERS LUNCH/REST AREA
7. SECURITY OFFICE
8. HOUSEKEEPING
9. GARBAGE
10. DISPATCH OFFICE
11. EXISTING LEASABLE RETAIL
12. QUEUING
13. WAITING
14. SHIPPING/RECEIVING AREA
15. MECHANICAL/ELECTRICAL

0 3 9 18 30 metres

[A] PACKAGE WATER-COOLED AIR-CONDITIONING UNIT
—SA— SUPPLY AIR
—FA— CONDITIONED MAKE-UP AIR
—EA— EXHAUST AIR
—HW— HEATING WATER
—CH— COOLING WATER

HAMILTON STATION

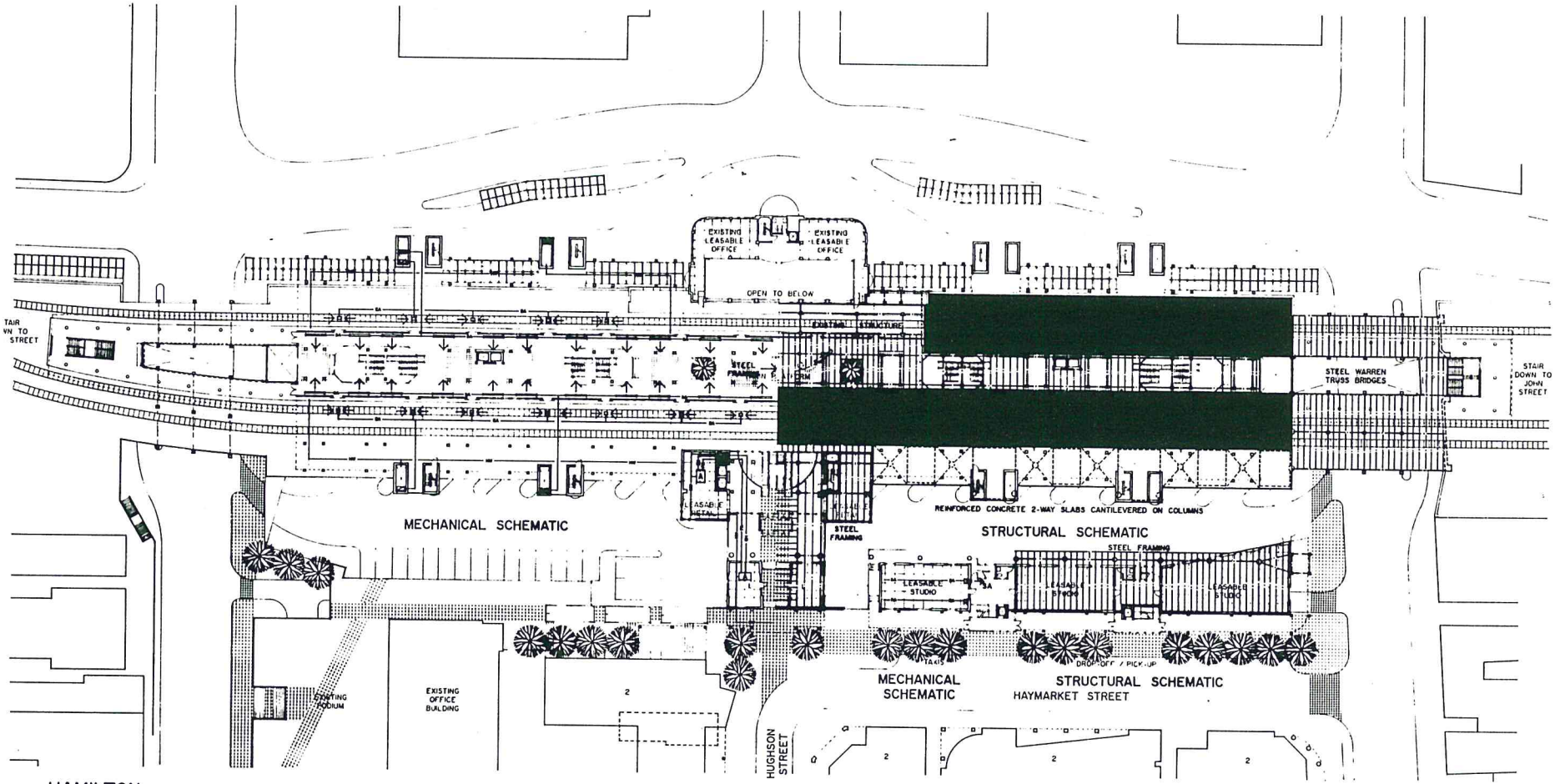
GO TRANSIT

STRUCTURAL /MECHANICAL SCHEMATICS

MAIN LEVEL PLAN

DECEMBER 1992

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



HAMILTON STATION

TRANSIT

STRUCTURAL /MECHANICAL SCHEMATICS

TRACK LEVEL PLAN

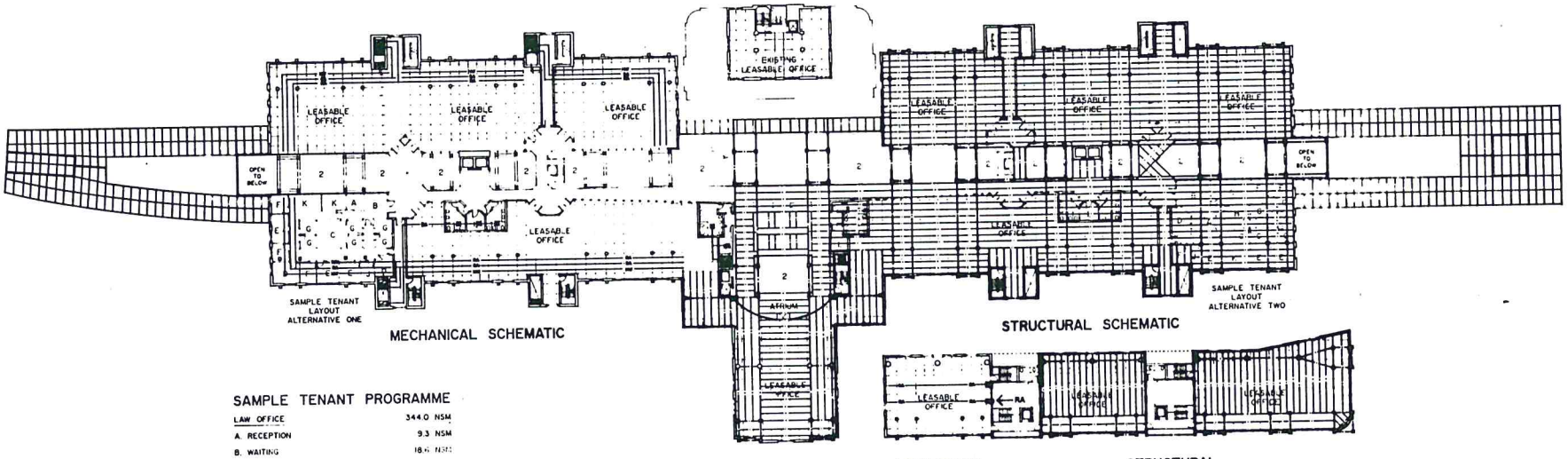
DECEMBER 1992

1. LEASABLE RETAIL
2. POSSIBLE FUTURE COMMERCIAL DEVELOPMENT

0 3 9 18 30 metres

[A] PACKAGE WATER-COOLED AIR-CONDITIONING UNIT
-SA- SUPPLY AIR
-FA- CONDITIONED MAKE-UP AIR
-EA- EXHAUST AIR
-HW- HEATING WATER
-CH- COOLING WATER

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



SAMPLE TENANT PROGRAMME

LAW OFFICE	344.0 NSM
A. RECEPTION	9.3 NSM
B. WAITING	18.6 NSM
C. LARGE CONFERENCE ROOM	27.9 NSM
D. SMALL CONFERENCE ROOM	16.3 NSM
E. LARGE OFFICE (3)	13.9 NSM
F. OFFICE (3)	9.3 NSM
G. SMALL OFFICE (6)	7.0 NSM
H. LIBRARY	11.6 NSM
J. STORAGE	8.4 NSM
K. SECRETARIAL AREA	27.9 NSM
TOTAL NET PROGRAMME AREA	232.6 NSM

AH AIR HANDLING UNIT
EF EXHAUST FAN
-SA- SUPPLY AIR
-RA- RETURN AIR
-FA- FRESH AIR
-EA- EXHAUST AIR
-HW- HEATING WATER
-CH- COOLING WATER

1. HOUSEKEEPING
2. OPEN TO BELOW

0 3 9 18 30
metres

HAMILTON STATION

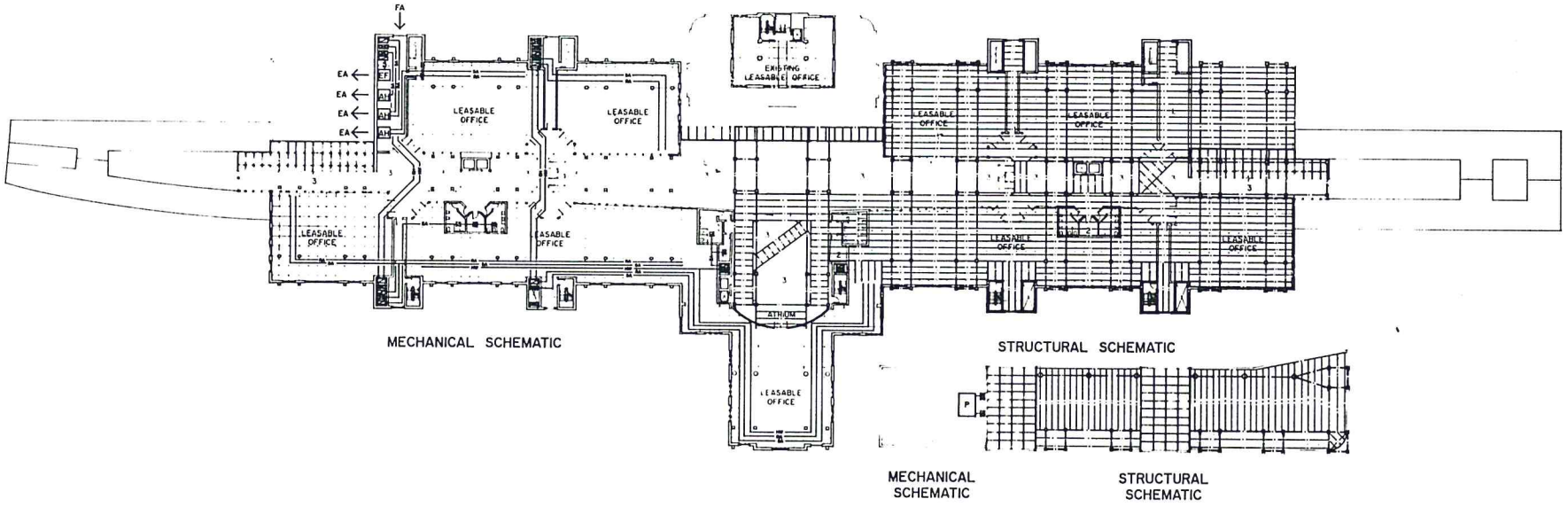
TRANSIT

STRUCTURAL /MECHANICAL SCHEMATICS

FIRST OFFICE LEVEL PLAN

DECEMBER 1992

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



HAMILTON STATION

TRANSIT

STRUCTURAL /MECHANICAL SCHEMATICS

SECOND OFFICE LEVEL PLAN

DECEMBER 1992

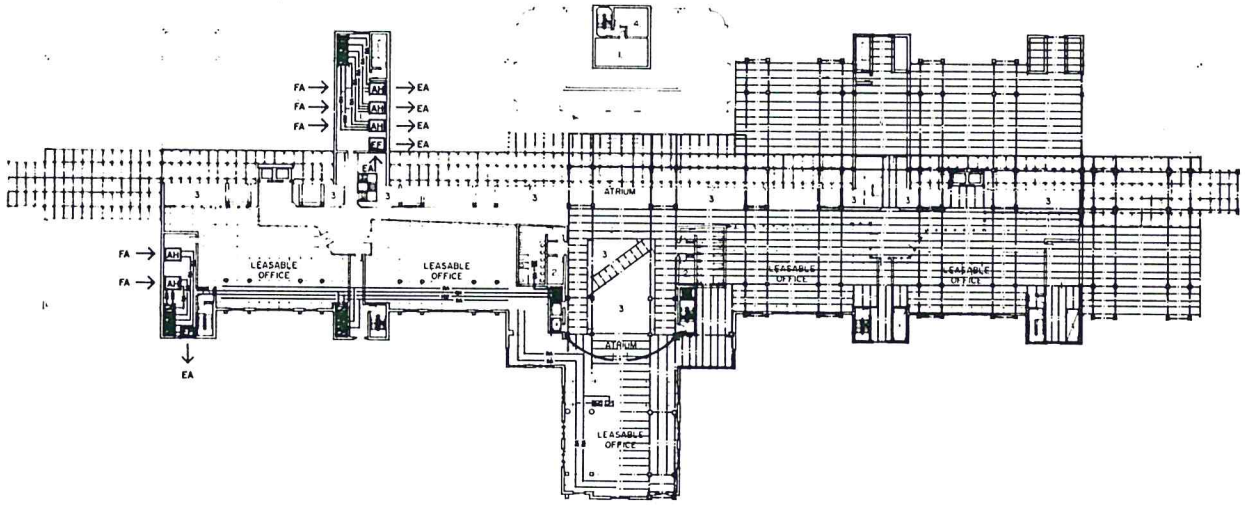
P PACKAGE ROOFTOP AIR-CONDITIONING/HEATING UNIT
AH AIR HANDLING UNIT
EF EXHAUST FAN

1. MECHANICAL
2. HOUSEKEEPING
3. OPEN TO BELOW

—SA— SUPPLY AIR
—RA— RETURN AIR
—FA— FRESH AIR
—EA— EXHAUST AIR
—HW— HEATING WATER
—CH— COOLING WATER

0 3 9 18 30
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



MECHANICAL SCHEMATIC

STRUCTURAL SCHEMATIC

HAMILTON STATION

TRANSIT

STRUCTURAL /MECHANICAL SCHEMATICS

THIRD OFFICE LEVEL PLAN

DECEMBER 1992

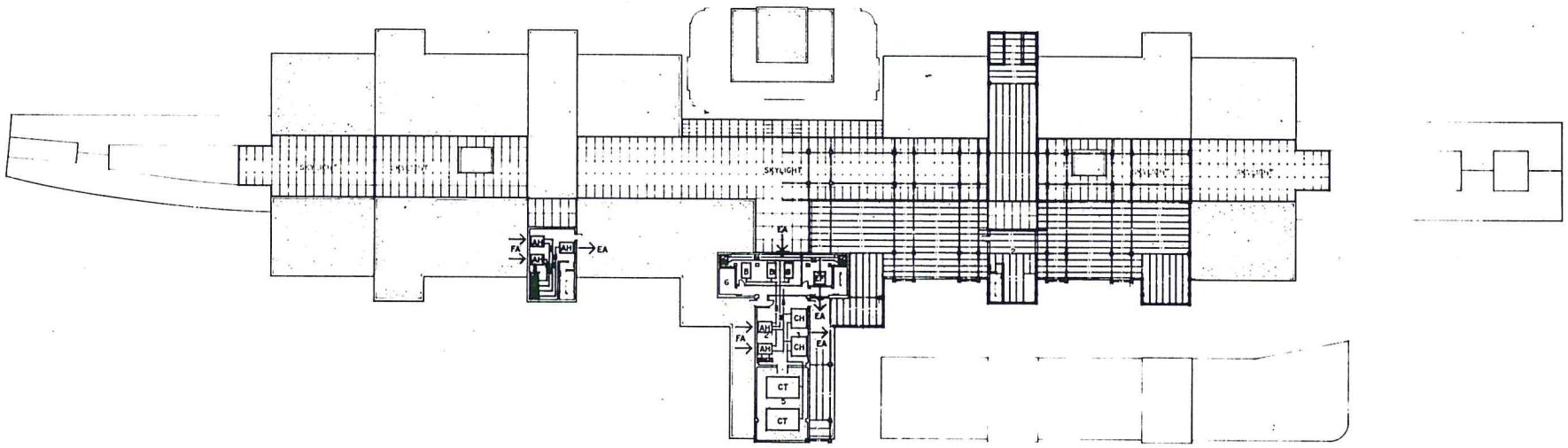
1. MECHANICAL
2. HOUSEKEEPING
3. OPEN TO BELOW
4. ELEVATOR MACHINE

AH AIR HANDLING UNIT
EF EXHAUST FAN
—SA— SUPPLY AIR
—RA— RETURN AIR

—FA— FRESH AIR
—EA— EXHAUST AIR
—HW— HEATING WATER
—CH— COOLING WATER

0 3 9 18 30
metres

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS



MECHANICAL SCHEMATIC

STRUCTURAL SCHEMATIC

HAMILTON STATION

TRANSIT

STRUCTURAL /MECHANICAL SCHEMATICS

MECHANICAL PENTHOUSE & ROOF PLAN

DECEMBER 1992

B 1. BOILERS
AH 2. AIR HANDLING UNITS
CH 3. CHILLERS
EF 4. EXHAUST FAN
CT 5. COOLING TOWERS
6. ELEVATOR MACHINE

0 3 9 18 30
metres

-SA- SUPPLY AIR DUCT
-RA- RETURN AIR
-FA- FRESH AIR
-EA- EXHAUST AIR
-HW- HEATING WATER
-CH- COOLING WATER

ROSS HANHAM
RAIC SYLLABUS
DESIGN THESIS

PARKER CONSULTANTS

C.C. Parker Consultants Limited
Consulting Professional Engineers
1400 Rymal Road East, Hamilton,
Ontario L0R 1P0 (416) 385-3234
Fax (416) 385-3534

February 11, 1992

Mr. Ross Hanham
957 Filmandale Road
Burlington, Ontario
L7T 2Z2

Dear Mr. Hanham:

RE: Syllabus Thesis

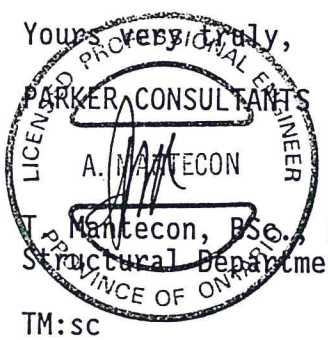
I have thoroughly examined your thesis and may I congratulate you on having achieved a very interesting and appealing structure which pleasantly fills the void now existing on the site. The truss-like configuration of the structure works well with the transit medium it depicts.

On the structural component of the building, I offer the following points and suggestions:

- On the upper floor the four-column towers can easily be incorporated into a suitable floor plan, under tenants' improvements. The re-working of column locations will take away from the truss-like structure.
- Redundancy in the lower level can easily be eliminated by designing the elevated track lines as reinforced trapezoidal bridges. The bridges should be separated from the adjacent structure by expansion joints to prevent train vibrations from being transmitted to the office and mall space.
- The adjacent roof over the bus bays can be designed as two way slabs cantilevered on columns.
- The parking structure below can also be designed as two way slabs on columns, eliminating many of the columns.

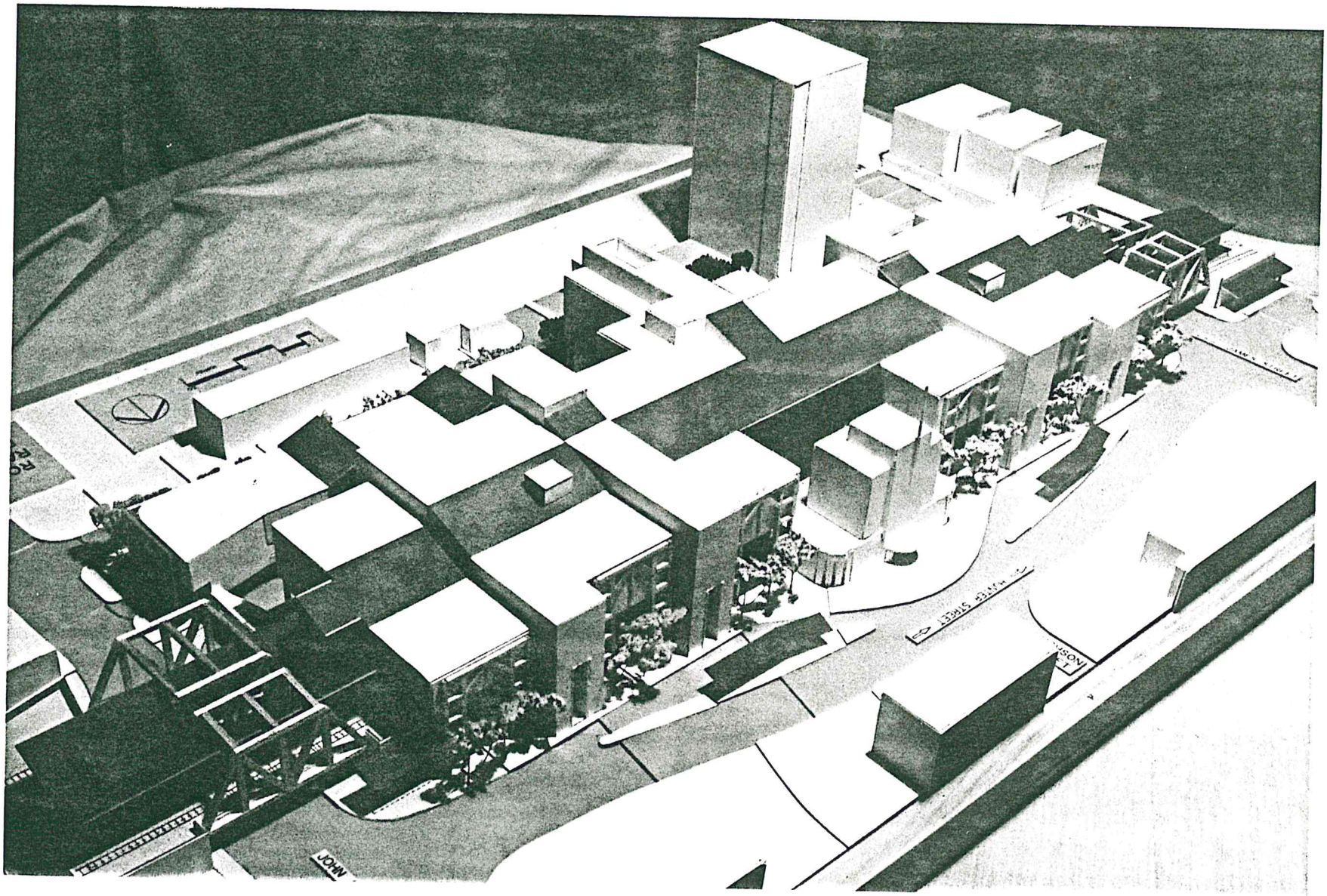
As we discussed during our two meetings and in this follow-up letter, it is my opinion that much of the redundancy has been eliminated without taking away the bridge-truss configuration so appealing for this type of building use.

Yours very truly,
PARKER CONSULTANTS

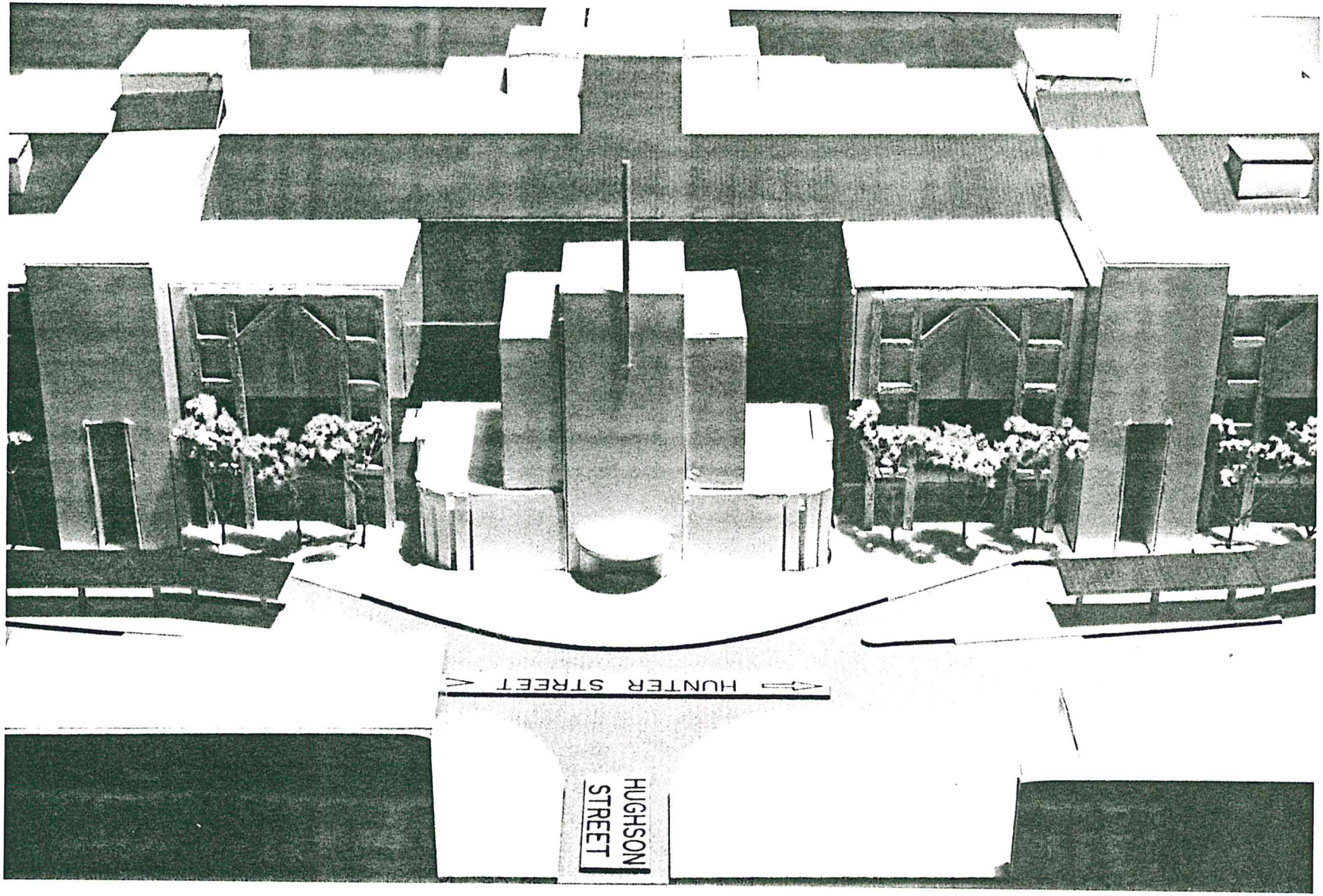


T. Mantecon, BSc., B.Eng., P.Eng.
Structural Department

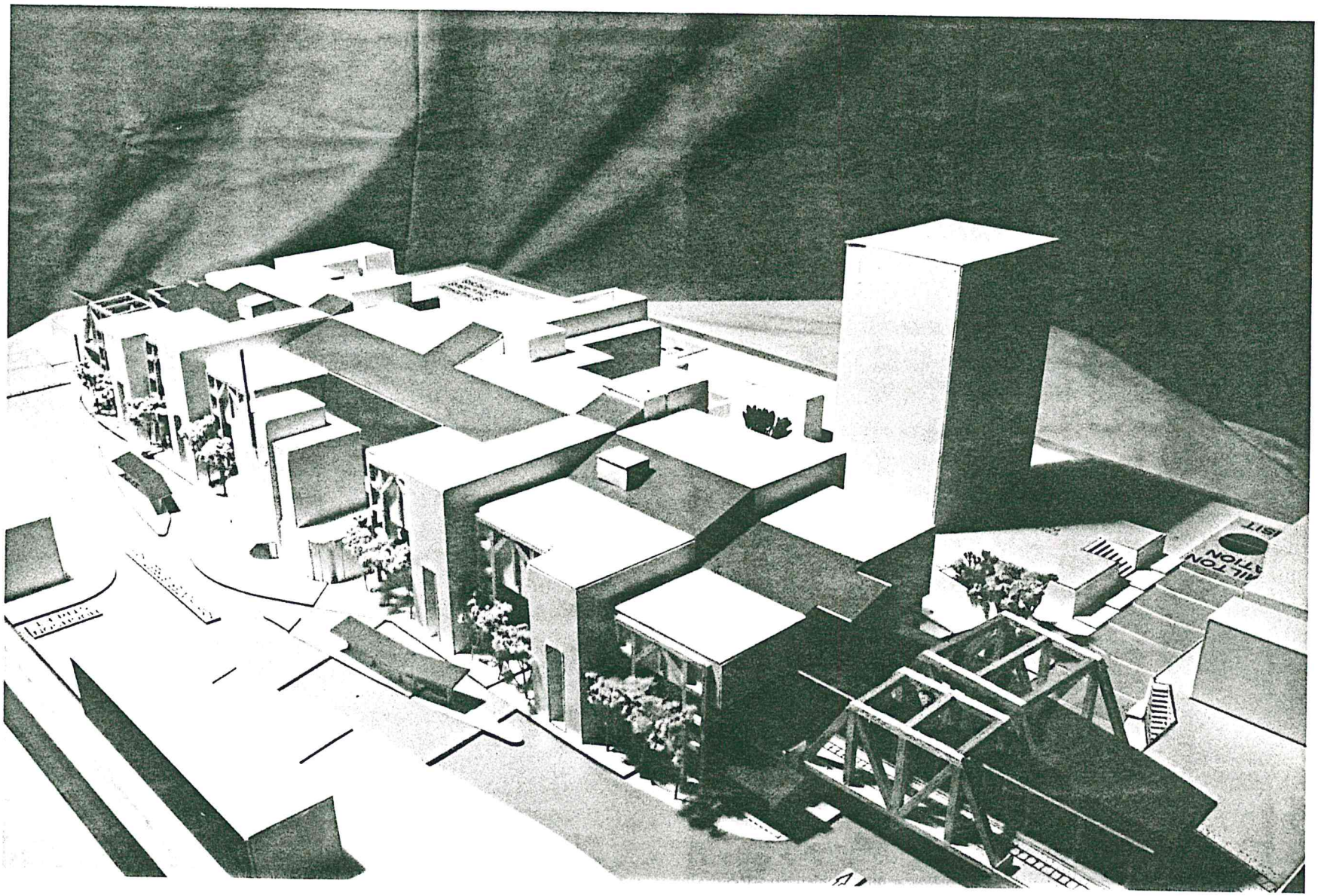
TM:sc



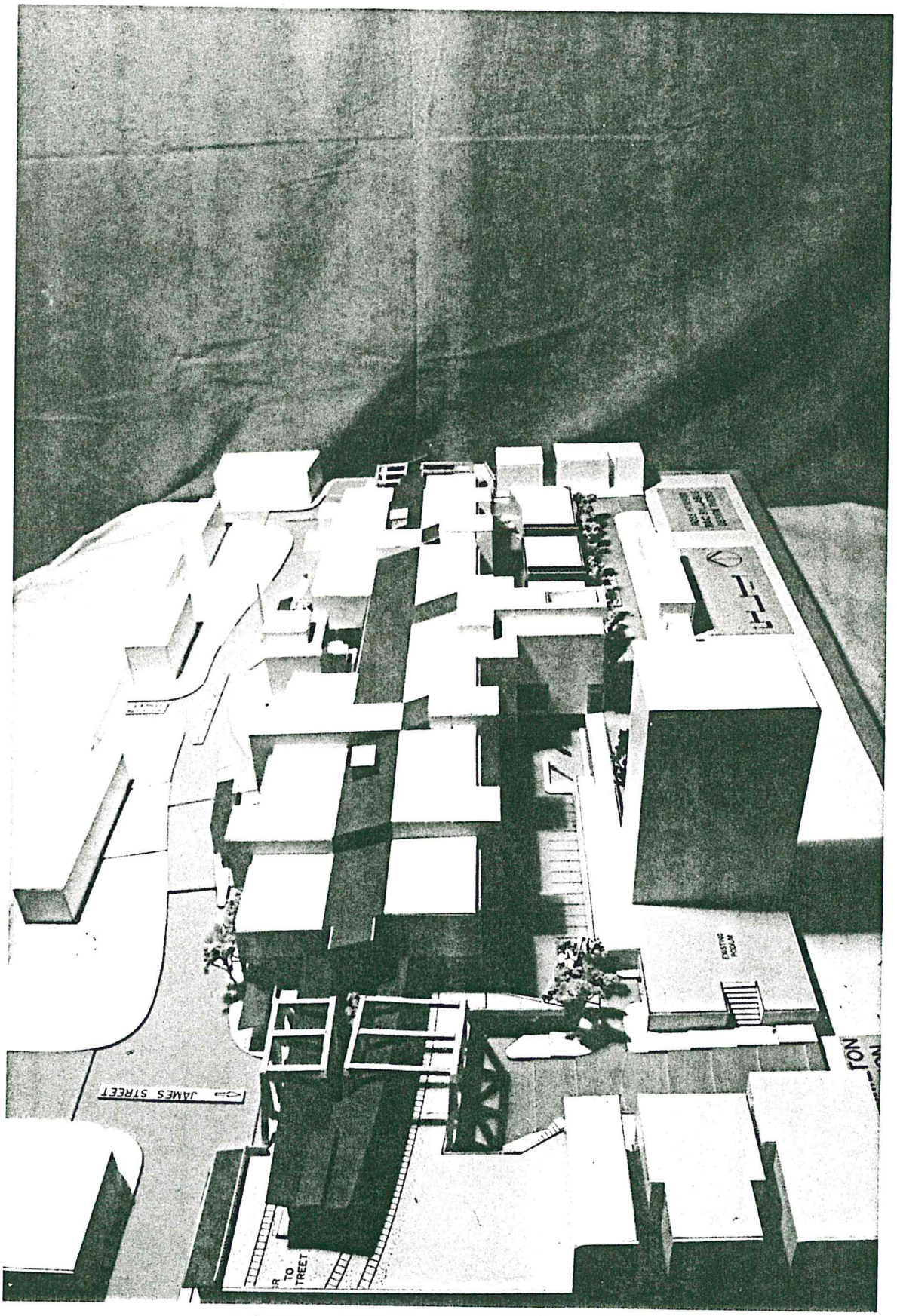
MODEL - AERIAL VIEW FROM NORTHEAST



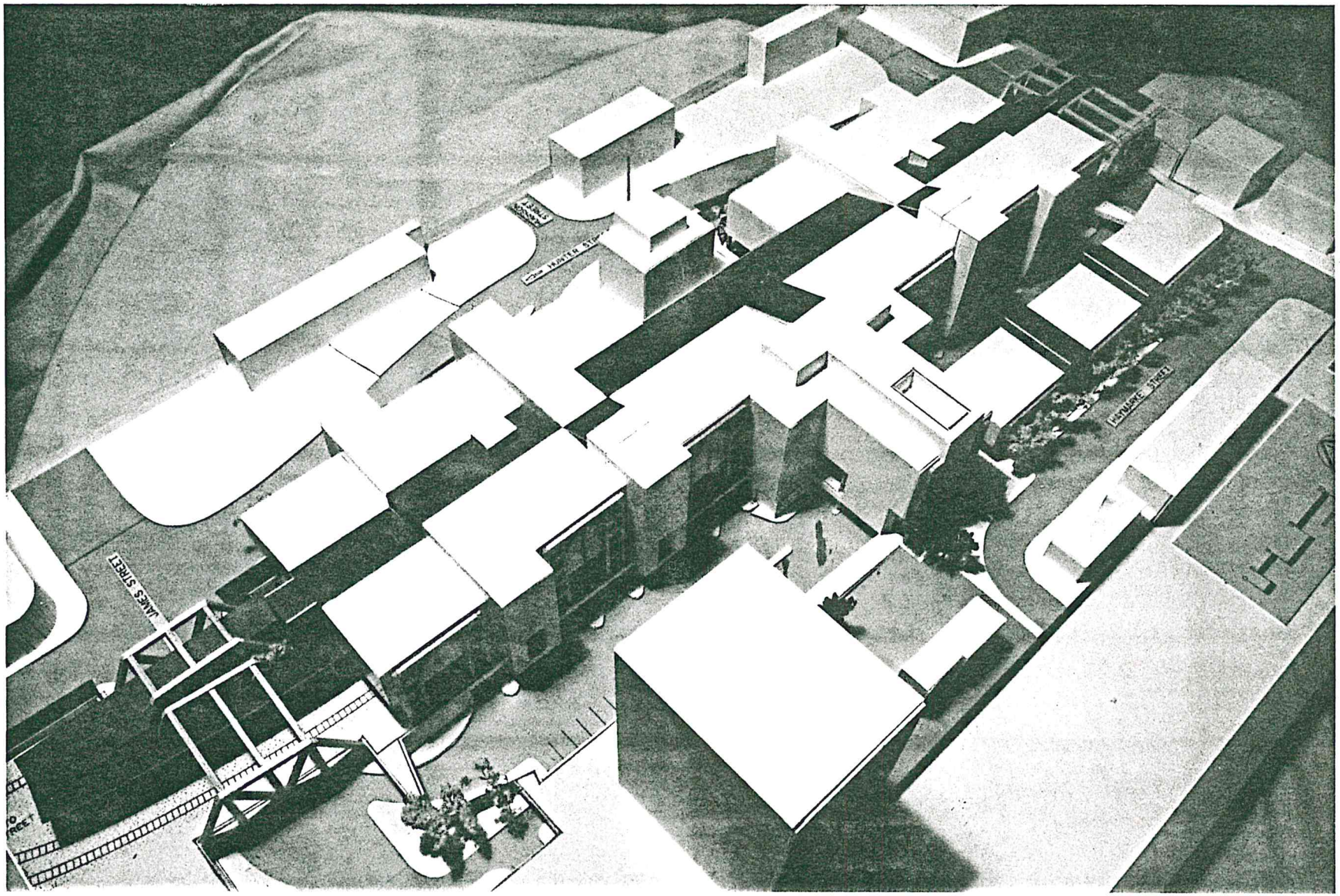
MODEL - VIEW OF EXISTING BUILDING



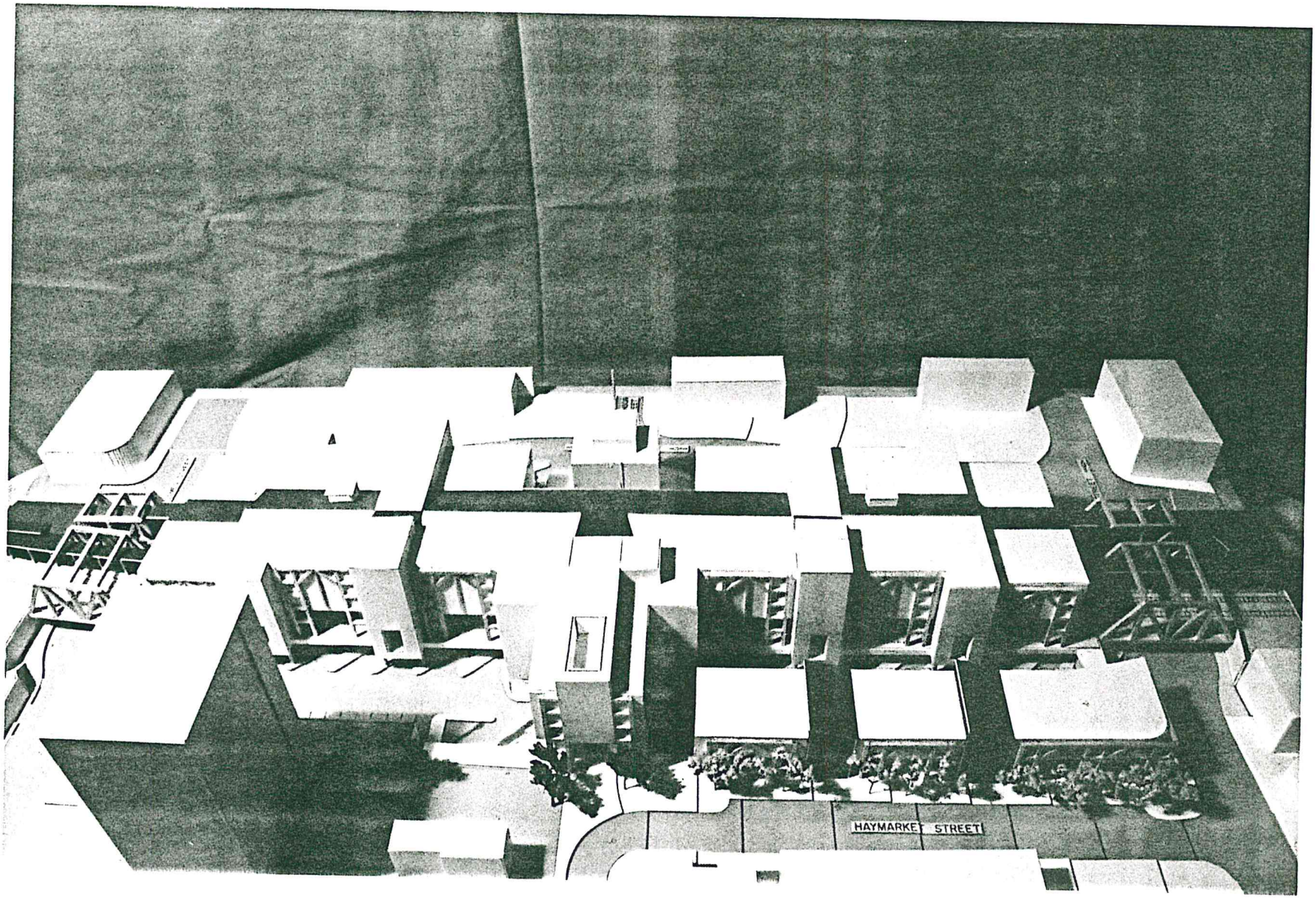
MODEL - VIEW FROM NORTHWEST



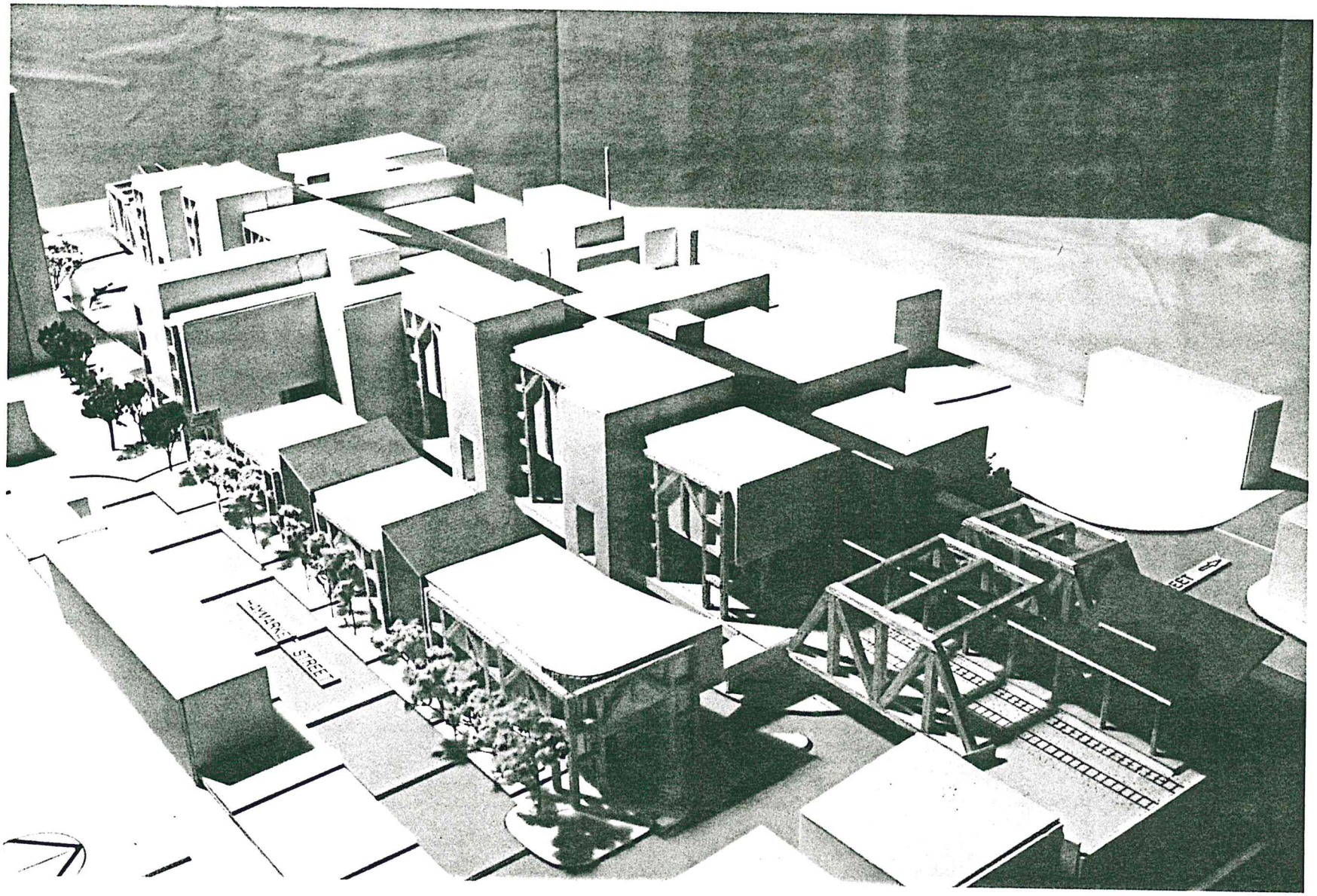
MODEL - AERIAL VIEW FROM WEST



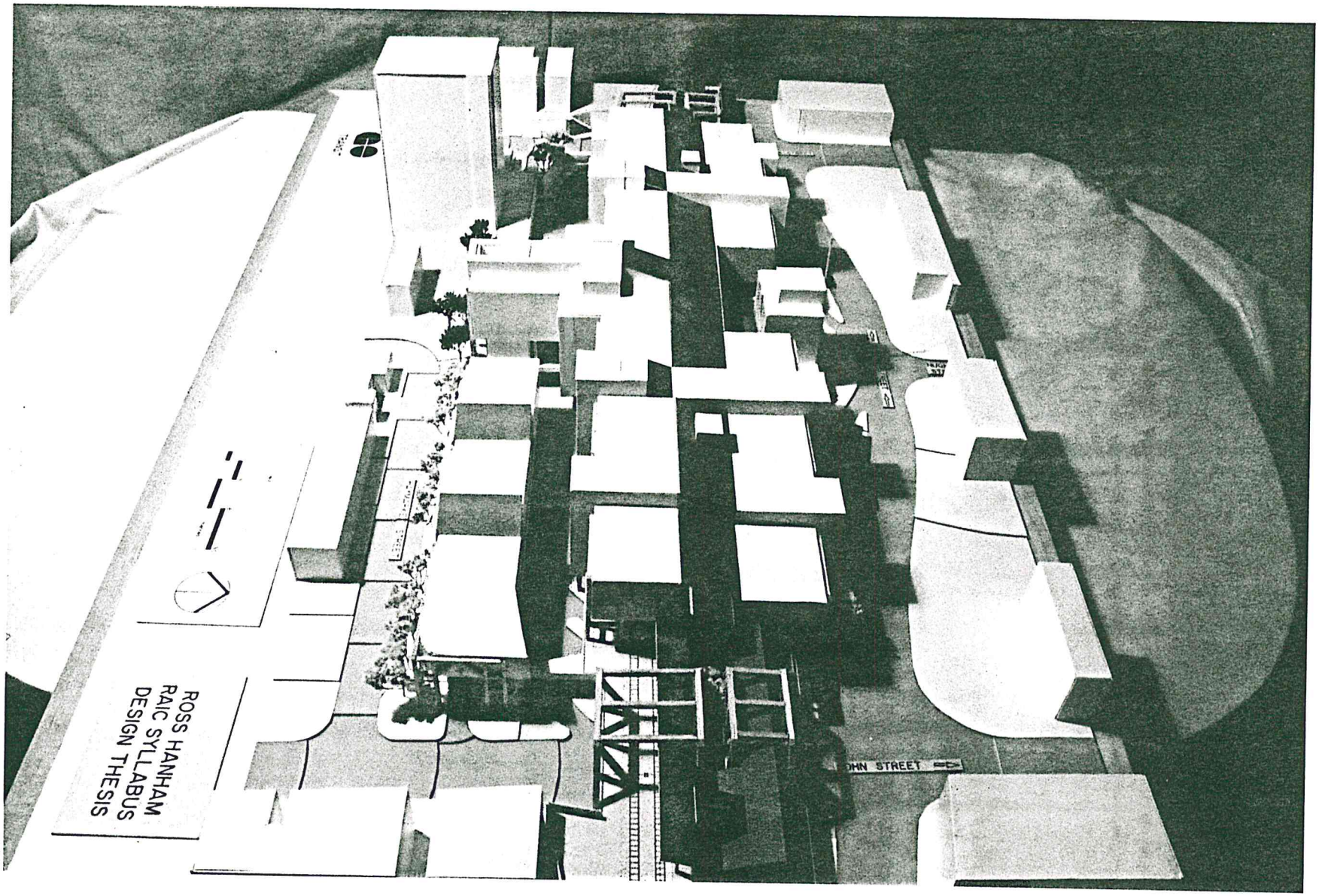
MODEL - AERIAL VIEW FROM SOUTHWEST



MODEL - AERIAL VIEW FROM SOUTH



MODEL - VIEW FROM SOUTHEAST



MODEL - AERIAL VIEW FROM EAST

HAMILTON GO TRANSIT STATION
ONTARIO BUILDING CODE ANALYSIS
December 1992

3.1.2. CLASSIFICATION OF PARTS OF BUILDING BY MAJOR OCCUPANCY

Parking Level : Group F, Division 3 Low Hazard Industrial - Storage Garage

Main Level : Group A, Division 2 Assembly - Passenger Station and Depot

Track Level : Group A, Division 2 Assembly - Passenger Station and Depot

First Office Level : Group D Business & Personal Services - Offices

Second Office Level : Group D Business & Personal Services - Offices

Third Office Level : Group D Business & Personal Services - Offices

3.1.3. MULTIPLE OCCUPANCY REQUIREMENTS

3.1.3.2. Applicable Building Height and Area
(for all major occupancies except Parking Garage per 3.2.1.2.)

Building Height: 5 storeys

Building Area: 6900 sq. m. (determined by First Office Level)

3.1.3.4. Superimposed Major Occupancies

- requirements of Subsection 3.2.2. for each portion of building containing a major occupancy apply to that portion as if the entire building was of that major occupancy.

- fire resistance rating of floor assembly between major occupancies has been determined on basis of requirements in Subsection 3.2.2. for the lower major occupancy.

3.1.3.6. Separation of Major Occupancies

- 1 hour between A2 and F3 occupancies. (see also 3.2.1.2.)
- 1 hour between A2 and D occupancies.

3.1.16. OCCUPANT LOAD

3.1.16.1. Occupant Load Determination

3.1.16.1.(1)(c)(i) - determined on the basis of the number of persons for which the area was designed. (refer to Architectural Programme - October, 1991)

3.1.16.1.(1)(c)(ii) - determined in accordance with Table 3.1.16.A.

Main Building

Floor Level	Type of Use	Area	Load per 3.1.16.1(1)(c)(i)	Load per 3.1.16.1.(1)(c)(ii)	Total Load
Parking Level	Storage Garage	12000		261	
					261
Main Level	Waiting		700		
	Ticket sales.		12		
	Queuing		160		
	Drivers' Area		20		
	Circulation		540		
	Dispatch		5		
	Retail	1500		405	
					1842
Track Level	Waiting		1600		
	Circulation		600		
					2200
Track Level	Retail	500		135	135
1st Office	Offices	5000		538	538
2nd Office	Offices	4300		443	443
3rd Office	Offices	2700		290	290

3.2. SIZE & OCCUPANCY REQUIREMENTS FOR FIRE SAFETY

3.2.1.1. Exceptions to Building Height in Storeys

3.2.1.1.(1) - roof-top enclosures for service rooms need not be considered in calculation

3.2.1.2. Storage Garage Considered as a Separated Building

- floor above basement to be constructed as a 2 hour fire-resistance rated assembly of concrete.

3.2.2. BUILDING SIZE & CONSTRUCTION RELATIVE TO OCCUPANCY

3.2.2.10. Roof-Top Enclosures

3.2.2.10.(1) - 1 storey roof-top enclosures for service rooms not required to have a fire-resistance rating.

3.2.2.12 Sprinklers in Lieu of Roof Rating

3.2.2.12.(1) - electrically supervised sprinkler system with direct signal to fire department permits fire-resistance rating of roof assemblies to be waived.

Parking Level - design per 3.2.1.2.

Main & Track Levels - design per 3.2.2.22, Assembly Buildings, Division 2, up to 5 Storeys, Any Area.
- non-combustible construction
- floor assemblies to be fire separations of 1 hour fire-resistance rating.
- loadbearing structure to have 1 hour fire-resistance rating.

Office Levels 1,2&3 - design per 3.2.2.41, Business & Personal Services Buildings, up to 6 Storeys.
- sprinklered
- 5 storeys
- 6,900 sq. m. building area
- facing 2 streets
- non-combustible construction
- floor assemblies to be fire separations of 1 hour fire-resistance rating.
- loadbearing structure to have 1 hour fire-resistance rating.

3.2.5. PROVISIONS FOR FIRE FIGHTING

3.2.5.3. Waiver for Access to Sprinklered Storeys
- requirements of 3.2.5.1. and 3.2.5.2. waived.

3.2.5.5. Access Routes
- access routes for fire department vehicles can be provided to one or both of the 2 north building entrances adjacent to elevators. Either of these could be designated as the principal entrance for fire fighting purposes subject to review with the Hamilton Fire Department.

3.2.5.6. Location of Access Routes
- the 2 north building entrances are located no less than 3 m. and no more than 15 m. from the adjacent municipal bus/taxi/drop-off/pick-up driveways. These driveways would be municipally designated fire access routes with no parking. All vehicles using these driveways would be continually occupied by drivers.

- fire department connection(s) will be provided. Hydrant(s) will be provided no further than 45 m. from these standpipe connections and adjacent to the access routes.

3.2.5. PROVISIONS FOR FIRE FIGHTING - cont'd

3.2.5.7. Access Route Design

- 6 m. wide
- centreline radius not less than 12m.
- overhead clearance not less than 5 m.
- change of gradient not more than 1 in 12.5 over 15 m.
- designed to support loads of fire department vehicles
- no dead end portions
- connected to municipal street.

3.2.6. ADDITIONAL REQUIREMENTS FOR HIGH BUILDINGS

3.2.6.1. Application

- not applicable
- dimension from grade to floor level of 3rd Office Level is less than 18 m.
- Track Level Occupant Load (2200) / 1.8x width of Track Level exit stairs (6 m.) = 204 < 300.
- 1st Office Level Occupant Load (538) / 1.8x width of 1st Office Level exit stairs (9.9 m.) = 30 < 300.
- 2nd Office Level Occupant Load (443) / 1.8x width of 2nd Office Level exit stairs (9.9 m.) = 25 < 300.
- 3rd Office Level Occupant Load (290) / 1.8x width of 3rd Office Level exit stairs (9.9 m.) = 16 < 300.

3.2.8. MEZZANINES AND OPENINGS THROUGH FLOOR ASSEMBLIES

3.2.8.3. Configuration

- unprotected openings through floor assemblies are of sufficient size and positioned relative to each other to be capable of containing, within the full height of the interconnected floor space, a cylinder with a cross-sectional minor axis of at least 7 m. and area of at least 65 sq. m.

3.2.8.4. Exits

- increased travel distance for sprinklered floor areas per 3.4.2.5.(1)(b) not applicable.

- access to exit from portions of floor areas not within interconnected floor space do not lead through interconnected floor space. Most leasable areas are provided with two means of egress not leading through the interconnected floor space. Leasable areas are not fire-separated from the interconnected floor space (ie. considered to be part of it) thereby permitting access to exit through it by either:

    - a public corridor that is more than 5 m. in width and, therefore, not required to be fire separated from the remainder of the building or,
    - a public corridor that is less than 5 m. in width and, therefore, separated from the remainder of the building by an unrated fire separation. (see also 3.3.1.4.)

3.3. SAFETY REQUIREMENTS WITHIN FLOOR AREAS

3.3.1.1. Separation of Suites
- Group D suites not required to be separated.
- Group E suites separated by 1 hour fire-resistance rated construction.

3.3.1.3. Means of Egress
- all suites have doorways into a public corridor.
- possible, from such doorways, to go in opposite directions to each of 2 separate exits (dead end corridors permitted - see 3.3.1.9.).

3.3.1.4. Public Corridor Separations
- unrated separations are provided where corridor width < 5 m.
- no separations required where corridor width > 5 m.

3.3.1.5. Egress Facilities
- two egress doorways for Group D & E suites > 200 sq. m. or with distance to egress doorway > 25 m.

3.3.1.6. Travel Distance
- maximum 40 m. to nearest egress doorway in Group D suites with 2 doorways.
- maximum 30 m. to nearest egress doorway in Group E suites with 2 doorways.

3.3.1.7. Protection on Floor Areas with a Barrier-Free Path of Travel
- requirements waived since building sprinklered.

3.3.1.9. Corridors
- dead end corridors permissible in Group D occupancies since second and separate egress doorways provided not leading into dead end corridor.

3.3.1.6. Capacity of Access to Exit

Main Level: 1842 persons x 6.1 mm. = required aggregate width of 11.24 m.

Track Level: 2200 persons x 6.1 mm. = required aggregate width of 13.42 m.

1st Office Level: 538 persons x 6.1 mm. = required aggregate width of 3.28 m.

2nd Office Level: 443 persons x 6.1 mm. = required aggregate width of 2.70 m.

3rd Office Level: 290 persons x 6.1 mm. = required aggregate width of 1.77 m.

3.4. REQUIREMENTS FOR EXITS

3.4.2.4. Travel Distance
- to be measured from any point in floor area since suites not fire separated from public corridors (see also 3.2.8.4. and 3.3.1.4.).

3.4. REQUIREMENTS FOR EXITS - cont'd

3.4.2.5. Location of Exits

- maximum 30 m. to nearest exit in Group A and E occupancies (Main Level and Track Level).
- maximum 40 m. to nearest exit in Group D occupancies (Office Levels).
- maximum 45 m. in sprinklered F3 occupancy (Parking Level) since not part of interconnected floor space.

3.4.3.5. Exit Capacity

Main Building

Level	Type of Facility	Width mm.	Capacity	Total Capacity	Occupant Load
Parking	Stairs	4400	478		
	Ramps	8000	1311	1789	261
Main	Doors	20700	3393	3393	1842
Track	Doors	57600	9442	9442	2200
1st Office	Stairs	9900	1076	1076	538
2nd Office	Stairs	9900	1076	1076	443
3rd Office	Stairs	9900	1076	1076	290

3.4.4. REQUIRED FIRE SEPARATION FOR EXITS

3.4.4.1. Fire Resistance Rating of Exit Separations

Parking Level - 2 hours.
Main Level - not applicable.
Track Level - not applicable per 3.4.4.3.
Office Levels - 1 hour.

3.4.4.2. Exits through Lobbies

- one permitted (Track Level leading to Haymarket Street).

3.4.4.3. Exterior Passageway Exceptions

- fire separation of exterior exit passageways not required at Track Level since more than 50% of exterior side is open to the outdoors and an exit stair is located at each end of the passageway.

3.6. HEALTH REQUIREMENTS

3.6.4. PLUMBING FACILITIES

3.6.4.2. Sanitary Facilities

Main Building

Level	Occupancy	Male WC required	Male WC provided	Female WC required	Female WC provided
Main/Track	Assembly/Retail	N/A*	7	N/A*	9
*Note: All rail passenger cars equipped with washrooms. Requirements to be negotiated.					
1st Office	Office	9	11	9	11
2nd Office	Office	8	11	8	11
3rd Office	Office	5	7	5	7

3.7. BARRIER-FREE DESIGN

3.7.1.2. Entrances

- 2 new entrances from Hunter Street are accessible.
- 2 new entrances from James and John Street respectively are accessible.
- all retail and office suites are accessible with the exception of the 2 leasable retail areas in the main building adjacent to Haymarket Street.

3.7.2.1. Areas Requiring Barrier-Free Path of Travel

- assembly areas (ie. Bus Platform and Train Platform) are accessible.
- all retail, studio and office suites are accessible with the exception of the 2 leasable retail areas in the main building adjacent to Haymarket Street.

3.7.2.2. Access to Parking Areas

- Parking Level is accessible by 4 elevators.
- barrier-free parking spaces are provided adjacent to the elevator lobbies.

3.7.2.3. Washrooms Required to be Barrier-Free

- barrier-free washrooms (in accordance with 3.7.3.8. to 3.7.3.11.) are provided in h the Main Level public washrooms and the Office Levels tenant washrooms.
- Office Level unisex washrooms in the smaller building on Haymarket Street are barrier-free and accessible from the Studio Level by elevator.

3.7.3.4. Ramps

- maximum gradient of 1 in 12.
- 1.5 m. level landings at top, bottom and maximum 9 m. intervals along length.

3.7.3.5. Elevators

- designed in accordance with CAN3-B355, "Elevating Devices for the Handicapped".

HAMILTON GO TRANSIT STATION
ELEMENTAL COST ANALYSIS

Element	Ratio to GFA	Elemental Cost Qty.	Unit Rate	Elemental Amount Subtotal	Total	Rate per Square Metre Subtotal	Total	%
1. Substructure					$1,220,000		$26.52	2.9%
a. Normal Foundations	0.261	12,000	$55.00	$660,000		$14.35		
b. Basement Foundations	1.304	60,000	$6.00	$360,000		$7.83		
c. Special Conditions	-	Sum	-	$200,000		$4.35		
2. Structure					$9,500,000		$206.52	23.0%
a. Lowest Floor Construction	0.261	12,000	$45.00	$540,000		$11.74		
b. Upper Floor Construction	0.739	34,000	$183.00	$6,222,000		$135.26		
c. Roof Construction	0.322	14,800	$185.00	$2,738,000		$59.52		
3. Exterior Cladding					$10,857,000		$236.02	26.3%
a. Roof Finish	0.322	14,800	$145.00	$2,146,000		$46.65		
b. Walls Below Ground Floor	0.074	3,400	$240.00	$816,000		$17.74		
c. Walls Above Ground Floor	0.350	16,100	$340.00	$5,474,000		$119.00		
d. Windows	0.075	3,450	$420.00	$1,449,000		$31.50		
e. Exterior Doors & Screens	0.002	110	$1,200.00	$132,000		$2.87		
f. Balconies & Projections	0.130	6,000	$140.00	$840,000		$18.26		
4. Interior Partitions					$1,355,000		$29.46	3.3%
a. Permanent Partitions	0.250	11,500	$95.00	$1,092,500		$23.75		
b. Movable Partitions	-	-	-					
c. Doors	0.005	250	$1,050.00	$262,500		$5.71		
5. Vertical Movement					$1,710,000		$37.17	4.1%
a. Stairs	-	140	$2,500.00	$350,000		$7.61		
b. Elevators	-	40	$28,000.00	$1,120,000		$24.35		
c. Escalators	-	6	$40,000.00	$240,000		$5.22		
6. Interior Finishes					$2,059,000		$44.76	5.0%
a. Floor Finishes	0.291	13,400	$80.00	$1,072,000		$23.30		
b. Ceiling Finishes	0.137	6,300	$65.00	$409,500		$8.90		
c. Wall Finishes	0.598	27,500	$21.00	$577,500		$12.55		

Element	Ratio to GFA	Elemental Cost Qty.	Unit Rate	Elemental Amount Subtotal	Total	Rate per Square Metre Subtotal	Total	%
7. Fittings & Equipment					$2,070,000		$45.00	5.0%
a. Fittings & Fixtures	1.000	46,000	$30.00	$1,380,000		30		
b. Equipment	1.000	46,000	$15.00	$690,000		15		
8(a) Electrical					$3,312,000		$72.00	8.0%
(i) Service & Distribution	1.000	46,000	$40.00	$1,840,000		$40.00		
(ii) Lighting & Power	1.000	46,000	$25.00	$1,150,000		$25.00		
(iii) Systems	1.000	46,000	$7.00	$322,000		$7.00		
8(b) Mechanical					$6,210,000		$135.00	15.0%
(i) Plumbing & Drainage	1.000	46,000	$27.00	$1,242,000		$27.00		
(ii) Fire Protection	1.000	46,000	$7.00	$322,000		$7.00		
(iii) HVAC	1.000	46,000	$101.00	$4,646,000		$101.00		
9. Overheads & Profit					$3,063,440		$66.60	7.4%
Net Building Cost					$41,356,440		$899.05	100.0%
10. Site Development					$5,400,000		$117.39	
a. General				$2,100,000		$45.65		
b. M & E Site Services				$1,100,000		$23.91		
c. Alterations				$1,400,000		$30.43		
d. Demolition				$800,000		$17.39		
11. Contingencies					$4,675,644		$101.64	
a. Design Contingency			5.0%	$2,337,822				
b. Escalation Contingency			2.0%	$935,129				
c. Construction Contingency			3.0%	$1,402,693				
TOTAL CONSTRUCTION COST					**$51,432,084**		**$1,118.09**	
GROSS FLOOR AREA		**46,000**						