

Thesis
WINNIPEG ARENA

DESIGN THESIS

R.A.I.C. SYLLABUS

"WINNIPEG ARENA"

R. JOHN WESELAKE

December 1981

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ABSTRACT

This Thesis deals with providing an Arena facility for downtown Winnipeg. The Arena is a unique building type which incorporates parking, commercial/retail and the Arena proper within one project. A facility that can work in conjunction with the Winnipeg Convention Centre or separately.

A sequence of alternate building forms (models) are shown which lead to a final illustrated solution. The final solution consists of 1 to 200 M. scale drawings and a 1 to 400 M. scale model.

Criteria influential in the design are noted in the Research (street systems, parking, pedestrian requirements, etc.) and Program (functional requirements). Circulation patterns, Mechanical schematics and Structural details of the Arena are also included.

The resulting solution is a building which respects pedestrian scale and provides an image of civic pride. "Arena", it is a place to go and have fun.

INTRODUCTION

The development of a 16,000 seat urban Arena in the downtown area of Winnipeg is feasible within the terms of reference used by The Adhoc Committee on Arena Alternatives.

Terms of Reference

A downtown site provides a convenient location to all parts of the city with a minimum investment required for transportation, streets and utilities.

This type of location for an arena would infuse large numbers of people into the Downtown after working hours which is one objective of Winnipeg's Development Plan.

A major benefit would be the increased use of downtown facilities,(restaurants, retail, parking, etc.). It would mean more tax dollars and promote upgrading of the downtown.

It also limits growth and diversification of people, servicing and tax dollars into the City's Additional Zone.

Parking available in the core area (Osborne to Notre Dame to King to Higgins and bound by the Red and Assiniboine Rivers) is sufficient to support Convention Centre, Concert Hall, M.T.C., Retail stores and New Arena in off periods (Sundays and Weeknights). 1

1. City of Winnipeg parking study for Arena Alternatives.

ACKNOWLEDGEMENTS

It is with the deepest appreciation that I express thanks to the following people. The three advisors who gave unstintingly of their time and professional acumen in support of this architectural thesis.

Professor Jacques Collin, Chairman, Thesis and Comprehensive Examination, Department of Architecture, the University of Manitoba, mentor. Jacques' encouragement kept me on track, his insight broadened mine and his generosity in support of this process was a constant catalyst in its development.

Professor Jim Lewis, Department of Environmental Studies, the University of Manitoba, co-ordinator. Jim's knowledge of the requirements of this thesis proved invaluable in meeting the necessary responsibilities, his perserverance fostered mine.

Mr. John Turner, Architect and President of the Manitoba Association of Architects, director. John devoted large blocks of time from a busy professional practise to contribute significantly to this thesis project. His previous experience in the Winnipeg Arena expansion proved invaluable in gaining first-hand knowledge from one who had encountered the problem before.

The firm of Smith Carter Partners, of which I have been associated since 1975, I thank for their interest and support of the syllabus program and for their consideration during the evolution of this thesis.

The following consultants who gave of their time and knowledge of their own professions:

Mechanical - Mr. Ed. Faraci, P. Eng.
E.J. Faraci & Associates

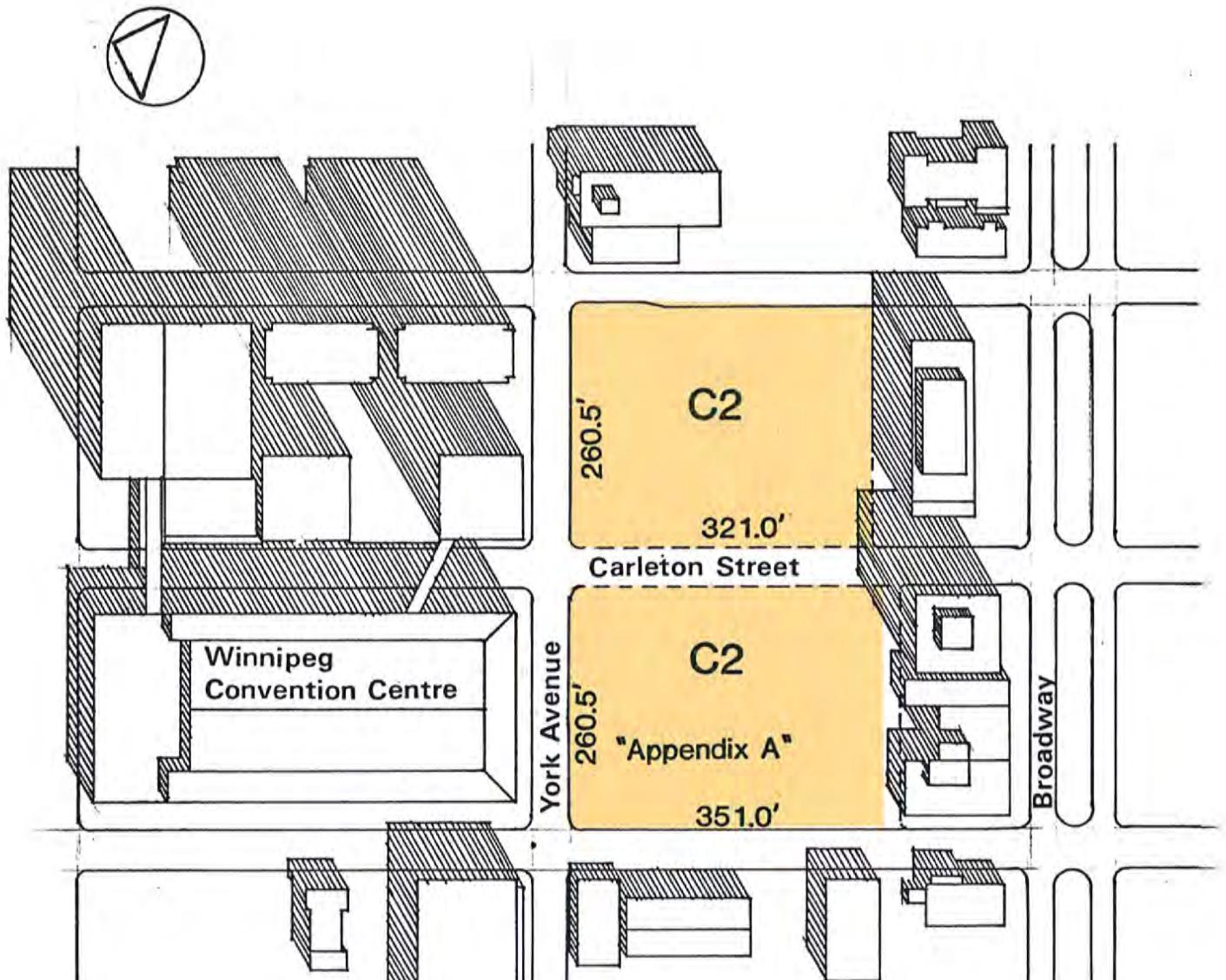
Structural - Mr. Bob Long, P. Eng.
Smith Carter Partners

Electrical - Mr. Harald Goodmanson
Smith Carter Partners

Acoustical - Mr. Don Ellis
Department of Environmental Studies
The University of Manitoba

My wife Diane for her patience and understanding during this thesis process.

Research Report



Proposed Site • 1" = 200'-0

Parking Structures Downtown Winnipeg

There are approximately 8000 stalls

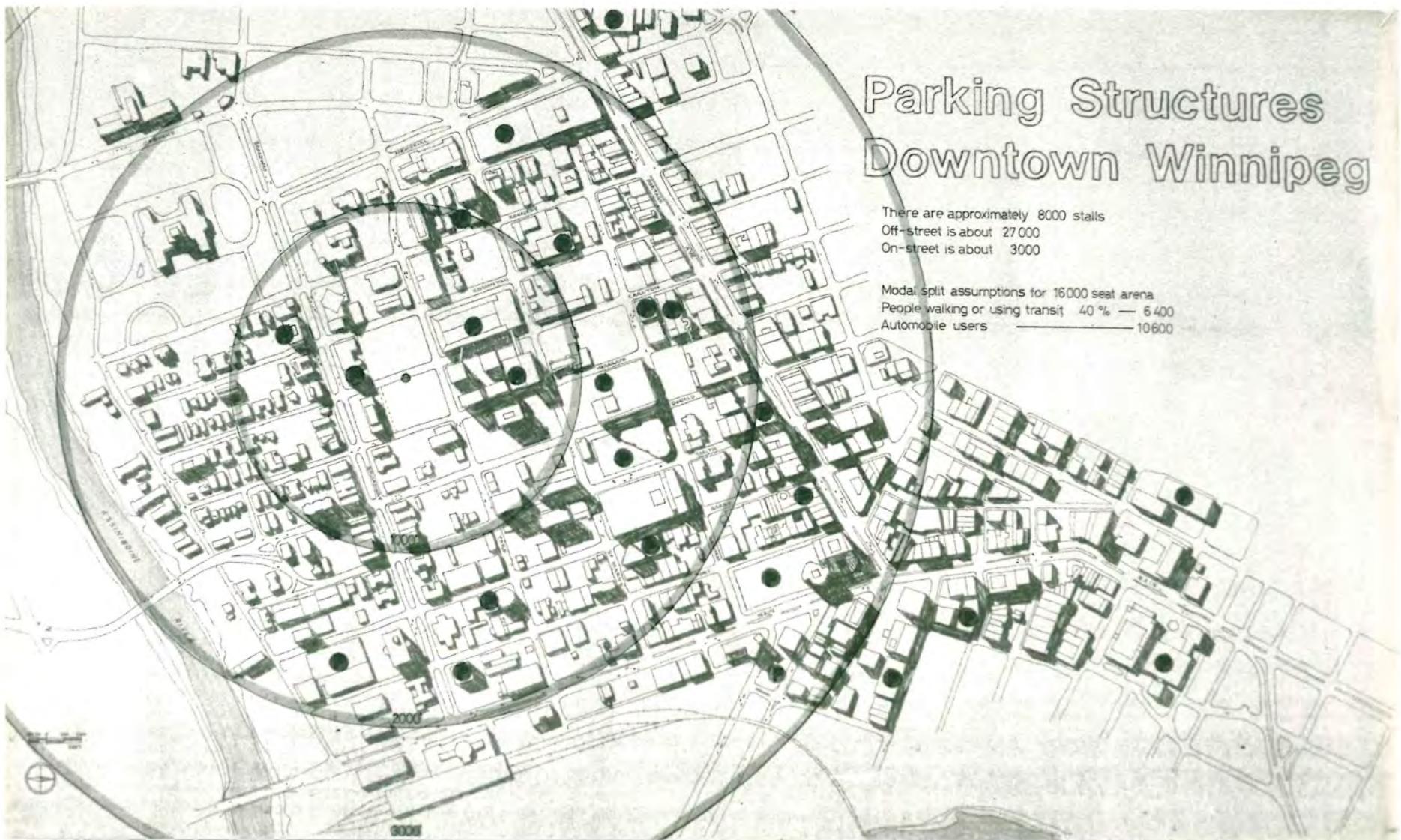
Off-street is about 27000

On-street is about 3000

Modal split assumptions for 16000 seat arena

People walking or using transit 40 % — 6400

Automobile users —————— 10600



PARKING

The assumed parking requirements for a 16,000 seat arena in the downtown is 4,600 stalls. This assumption is based on a split between transit and automobiles. The split is 40% transit and 60% private auto as opposed to 20% transit and 80% private auto for a suburban site.

People walking or using transit 40%	6,400
Automobile users	10,600
Assumed people per auto	2.25
Number of required parking stalls	4,600

The downtown area provides about 27,000 stalls. This figure includes parking structures and off-street parking. There is sufficient parking in the downtown and incorporation of a shuttle bus service would maximize the use of these facilities in the off hours.² It is desirable however to have some convenience and priority parking. An acceptable amount would be 430 stalls. This replaces already established monthly commercial parking provided (214 + 190) at the site and includes 25 employees of Winnipeg Enterprises. It is conceivable to increase parking facilities beyond 430 stalls. It is felt however that a marketing study would have to be conducted and it is beyond the scope of this program. Transportation and auto user habits could show an extreme change in the future. A provision of zero parking would tend to precipitate a parking problem in the immediate area.

Parking Revenue / 300 sq. ft. includes stall and part of access to stall. In Rupertsland Square it costs \$50.00 per month for below grade parking. That is \$6.00 per sq. ft. Retail in Convention Centre rents for \$8.00 per sq.ft.

* 2. This service is a utility of the City of Winnipeg and there are buses available during the off hours that can provide a network of service between parking structure (beyond 3000 ft.) and arena (10 minute intervals).

FINANCIAL MANAGEMENT

All events are conducted on a negotiated lease basis with the individual promotor of each event. The leases are a minimum fee plus a percentage of returns. The minimum fee is used to cover operating expenses. The percentage of gate returns is the profit. It is needed to reduce the Arena's principal debt.

To increase the profits and decrease the principal debt inclusion of commercial space seems viable because the site is located in a spot ear marked as part of Winnipeg's enclosed pedestrian system. This system would have a marketable flow of people. The commercial space and the parking facility would capitalize on this traffic during working hours and provide a more multi-use development.

The commercial and parking can be financed by the private sector. The lease arrangement can then provide a percentage of profits for the Arena without increasing the Arena's principal debt.

ARENA/CONVENTION CENTRE

A positive aspect of both the Arena and the Convention Centre is that they both attract people and a potential of revenue. They bring vitality into the downtown area and the impact of both facilities functioning together is not detrimental. They do not conflict with surrounding neighbours (commercial and office buildings) or present traffic problems by scheduling of main events during the rush hours.

The Convention Centre does draw a similar number of people as the arena about three to four times a year. A coincidence of both facilities drawing the same number of people in one evening could conceivably happen (once a year). The available parking in the downtown is adequate although some inconvenience could arise from similar timing of events (in the form of taking a few minutes longer to find a parking space). A more usual draw at the Convention Centre is 2,000 to 3,000 people.

There is a potential for both facilities to work jointly on one venture. Possibly a combined boat and automobile show. Therefore access between the Arena and Convention Centre should be considered.

SITE

The site considered is adjacent to the Winnipeg Convention Centre. It is bound by Edmonton, York, Hargrave and the lane north of Broadway. This would require the spanning of Carlton Street. The site has an area of 4.02 acres and 4.52 acres when spanning Carlton Street.

PUBLIC ACCESS, AMENITIES AND SERVICE

Efficient access must be provided for the unloading of passengers from automobiles and buses at a major entry point or plaza with consideration of the site, surrounding area and public street circulation. This includes a provision for the handicapped.

The commercial, enclosed pedestrian system and parking should be able to function separately from the Arena when access to the Arena is locked or simultaneously with it during planned events.

Concourse level of Arena should have appropriate crush space area for an arena of 16,000 seats. (60% people leave seats during intermission

and require 4 square feet of space). Vendor storage and concession stands are located on this level.

People entering arena will be in a spread out steady flow while the exiting of these same people after a game will be a maximum sudden surge. The number of exit widths should be designed in consideration of this and building code requirements.

Major service access for the complex can be into a central receiving point for both the Arena and Commercial. This would necessitate the use of a freight elevator connecting with the Arena. A provision for truck access unto ice level would not be necessary.

Circus requirements are for truck access with major unloading on the grade level receiving. Elephants gain entrance to Arena under their own power. It is usually a parade from freight train to the Arena and in this case the freight elevator.

SPORTS FACILITIES

The facility should meet the necessary requirements and standards for the professional sports it will house. Seating and spectator facilities should be of a standard typical to newer North American Arenas.

Consideration should be given to the placement of a controlled entry into arena for participants of sporting events. This entry could also serve the administration.

Hockey lockers should be 2 feet deep by 4 feet wide with adjacent dressing area of 16 square feet. This would include a bench or seat. The home hockey teams' dressing area should include club office and trainers office. Press room/interview room are used for before and after game interviews. They should be located close to hockey dressing rooms and lounge.

Volleyball tournament locker room requirements are the maximum for all sporting events in arena. The total is 96 lockers. It is 8 teams of 12 players with a potential 50% split male and female teams. Lockers should be 2 feet by 2 feet with a changing area of 12 square feet.

Circus performers and ice show entertainers would use these locker rooms. The total of 96 is adequate because most wardrobe and make-up stations are portable and the lockers would serve as additional space.

SUPPORT STAFF AND FACILITIES

There are twenty support employees and an additional five part-time trades people when the need arises. The twenty employees are divided into three shifts. The lunch room should accomodate one shift, fridge, range, sink, cupboards and table. Lockers can be included for outdoor apparel.

A storage area is needed for housing circus animals. Consideration should be given in terms of air handling and mechanical. Area should have floor drains for hosing down the floor. Location of this storage area should be close to staging.

ADMINISTRATION OFFICE

Location can be at ice level, grade or concourse level, but consideration should be given to access during normal working hours.

BOX OFFICE

It is used for the sorting and sale of tickets to the public on a day to day basis. The facility should be located for easy access by public when arena is closed.

TELEVISION BROADCASTING

A cable chase is required from each camera location to the mobile unit.

Camera positions need a 6 foot by 8 foot platform. Vantage points for hockey are as follows:

1 - in each corner of rink close to ice level	_____	4.
2 - mid height point at each end	_____	2
1 - in or above Press Box	_____	1
1 - opposite penalty box, platform or hand held	_____	1

Commentators booth requires video monitor, microphone and intercom system with mobile unit and cameras. Lighting should be 120 to 125 foot candles with 100% metal halide and 20% incandescent.

TICKET WICKETS

Wickets are used for the sale of tickets immediately prior to the event.

These would be located at all open entries to Arena.

COMMERCIAL

The percentages for Commercial Rental Unit areas is based on a typical merchandising plan (Winnipeg Square). The percentages are for the remaining floor areas less services, circulation and restaurant.

500 sq. ft. R.U.	_____	15%
1000 sq. ft. R.U.	_____	30%
1500 sq. ft. R.U.	_____	25%
2000 sq. ft. R.U.	_____	25%
3000 sq. ft. R.U.	_____	5%

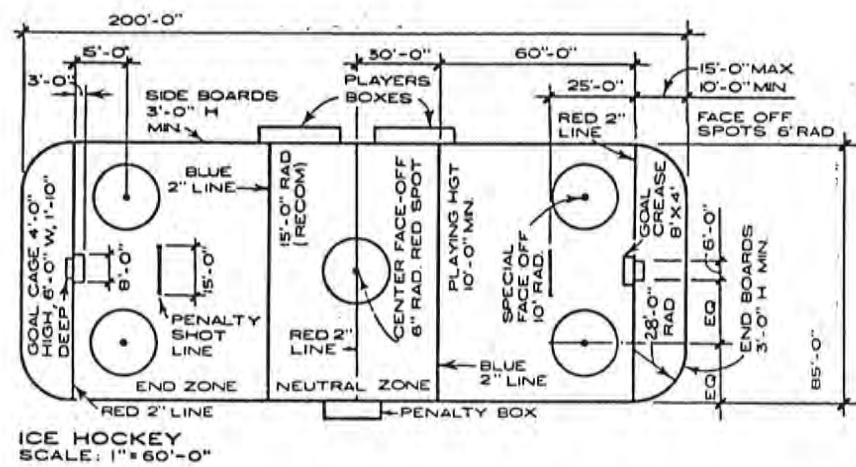
IMAGE OF BUILDING

The building will be of substantial size that careful attention should be given to the facade design and how it relates to human scale. The image should reinforce and compliment the purpose of Arena and the fact, that it will be a source of pride to many Winnipeggers.

The commercial section can be part of the Arena's appearance or present it's own distinct image. This will need careful design attention. The interior circulation through the commercial is in reality a street. The idea of street should then be reflected in the design of this area.

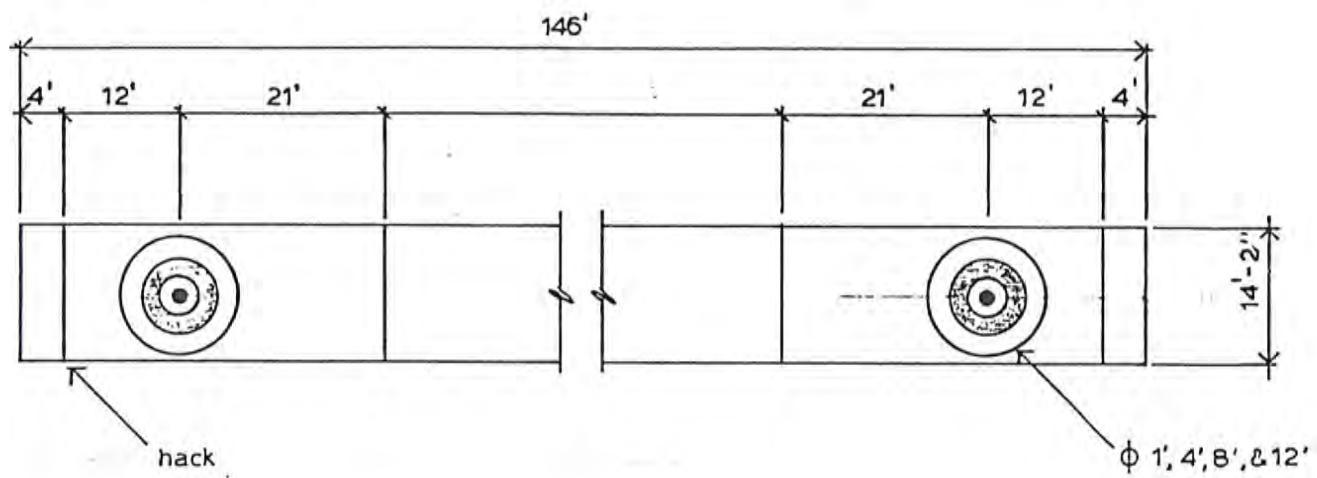
PROJECTED USES

HOCKEY - Rink size for professional hockey is 85 feet by 200 feet. Darker board height is 4 feet. Safety glass should surround each quarter section of rink at the goal ends or ideally around the whole perimeter of rink. This however, tends to separate spectators from players. Two team benches of 125 square feet each with access to locker rooms and unto ice.

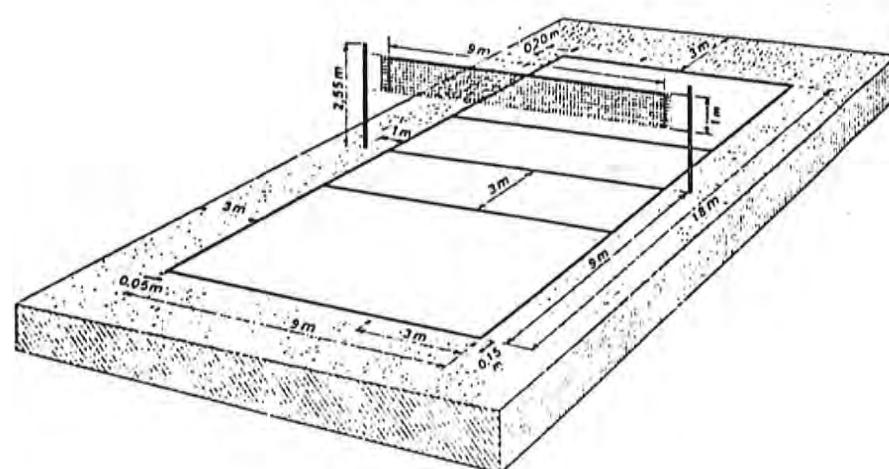


CURLING

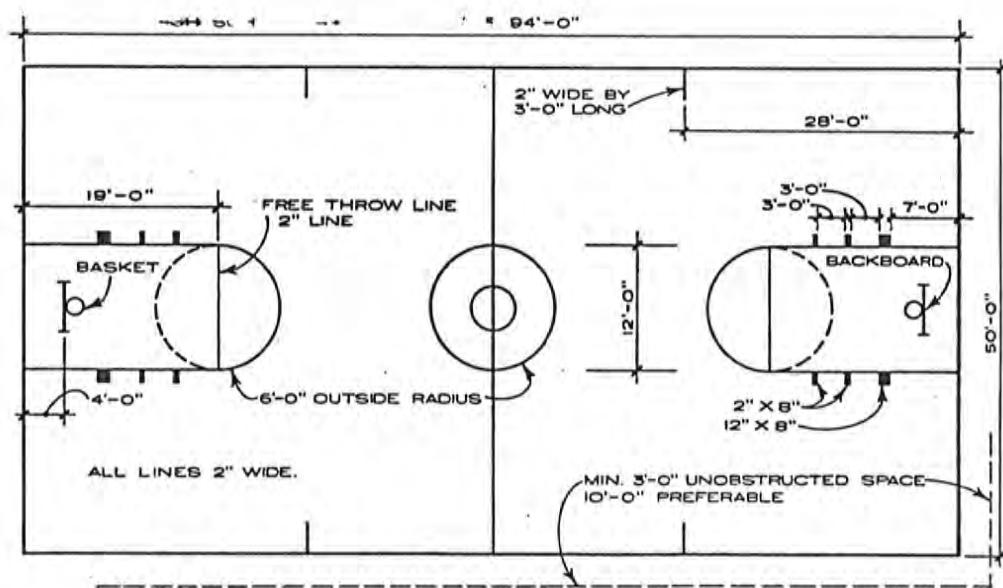
Playing surface measures 14 feet 2 inches wide by 146 feet long. The Manitoba Bonspiel requires four rinks for finalist competition.



VOLLEYBALL - Courts should have adequate playing floor surface and measure 40 feet by 60 feet with a 10 foot buffer between courts. Requirement is four courts.

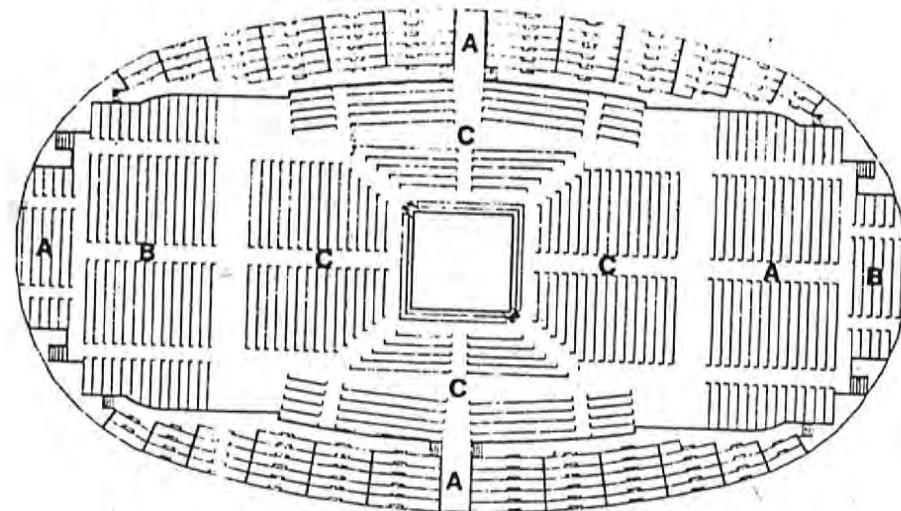


BASKETBALL - Court should have adequate playing floor surface and measure 50 feet by 94 feet with a 10 foot perimeter buffer.

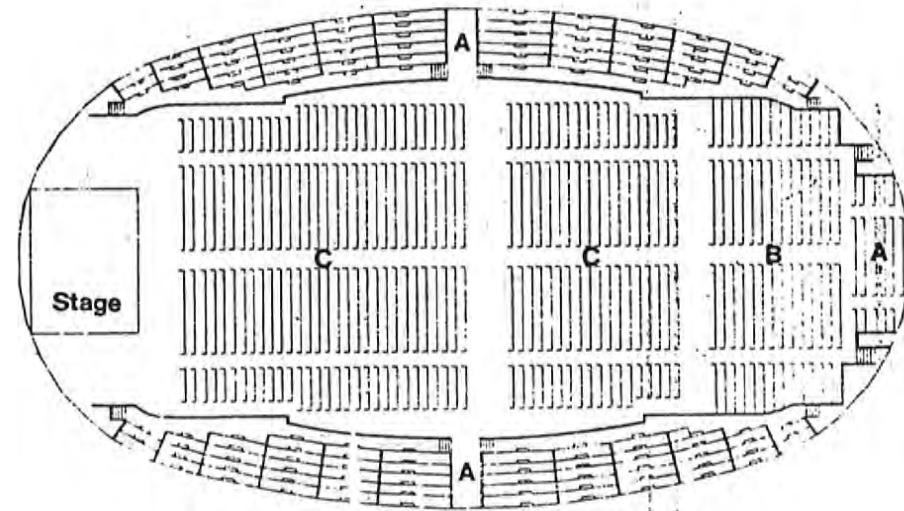


WRESTLING

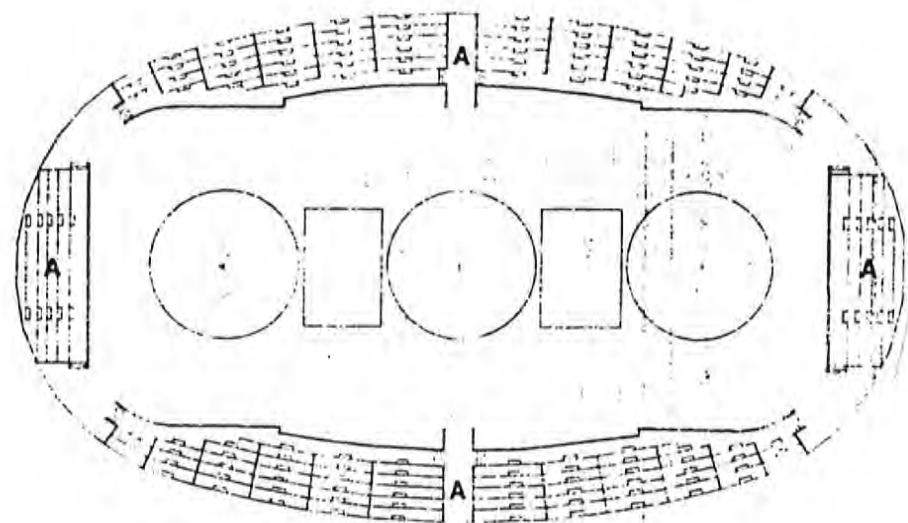
- The requirement is similar to boxing. Platform measures 4 feet high by 24 feet square. Ring size is 20 feet square.



ROCK CONCERTS - Live entertainment requires a stage placed at end of arena. Platform is 6 feet high by 25 feet deep by 30 feet long.



CIRCUS - They consist of three rings placed in rink area of 85 feet by 200 feet. Three rings with diameters of 40 feet set 65 feet apart. Floor surface is interlocking plywood sheeting.



Architectural Program

PROGRAM

Up-dated Program from Imperial measure to Metric.

	<u>TOTAL SQUARE METRES</u>
1. <u>Parking</u>	431 Stalls <u>15,500</u>
2. <u>Entry Level</u>	<u>10,500</u>
Receiving	800
Public Entry Mall	5,900
Commercial	1,120
VIP/Players	80
Arena Lobby	2,450
Box Office	<u>150</u>
Total	10,500
3. <u>Commercial Level</u>	<u>14,800</u>
Commercial Rental Units	11,500
W.C. - 2 @ 2 X 5 =	70
Service - 8 X 27 =	200
Arena Link, Vertical Circulation, Mechanical, and Mall	<u>3,030</u>
Total	14,800
4. <u>Ice Level</u>	<u>13,700</u>
Ice and Lower Seating	2,664
Sports Facilities (Appendix B)	836
Arena Club	726
Display	990
Vendors, Maintenance Staff, Ushers, Engineer, and Superintendant	400
Washrooms 4 @ 40 =	160
Shop	288
Staging and Receiving	400
Zamboni	35
Refuse	45
Mechanical - Ice Plant, Generator, Transformer, Switch Room, Air Handling Units, and Electrical	1,500
Storage	1,300
Bulk Storage & Unassigned:	1,956
Circulation	<u>2,400</u>
Total	13,700

PROGRAM - Continued

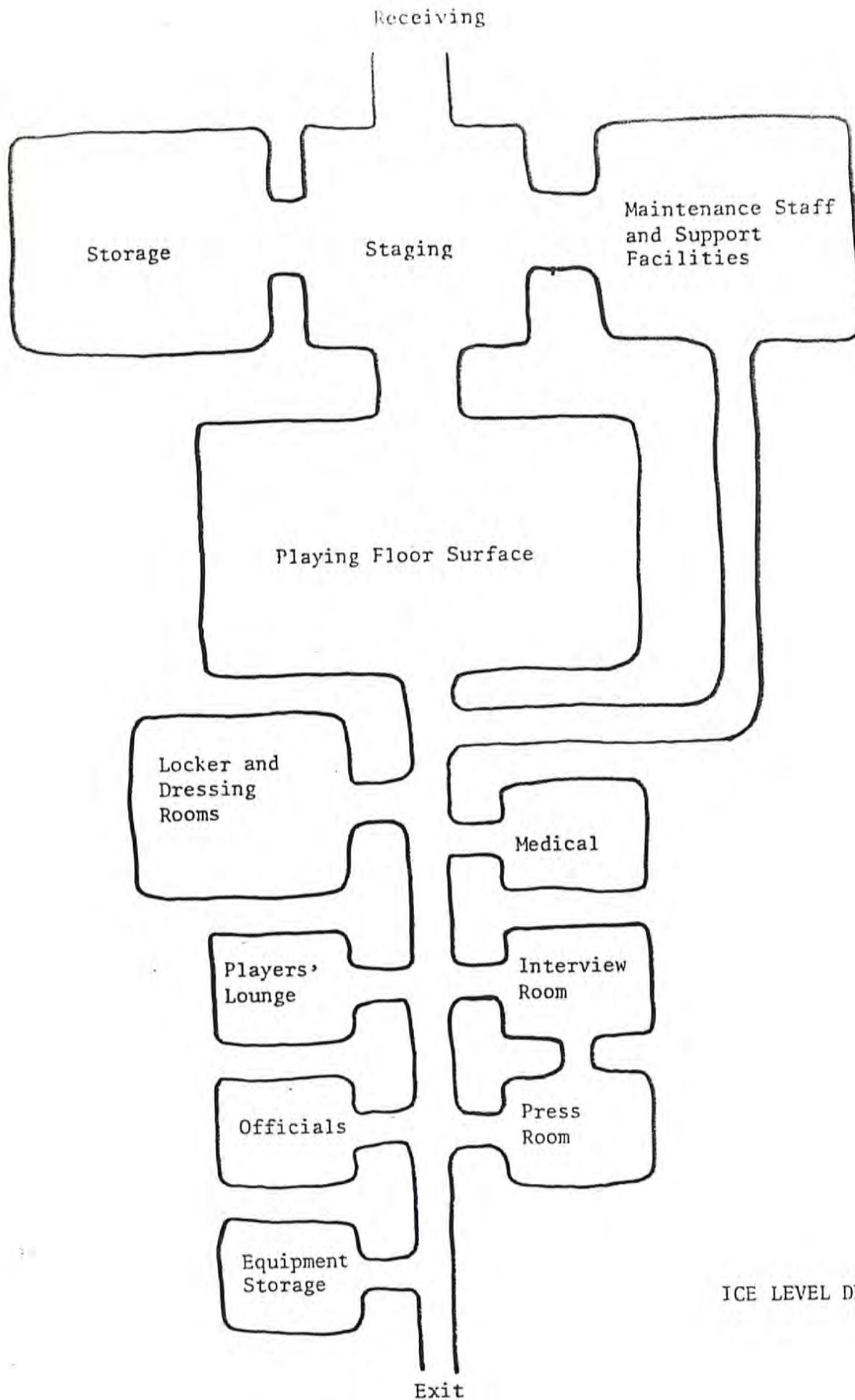
	<u>TOTAL SQUARE METRES</u>
5. Lower Concourse	<u>6,550</u>
Hall of Fame & Display	1,425
Storage	480
Air Handling Units	90
W.C. - 4 @ 75 =	300
Restaurant	500
Lounge	500
Circulation	775
Seating	<u>2,480</u>
Total	6,550
6. Main Concourse	<u>6,850</u>
Seating	500
Concessions & Boxes	400
Vertical Circulation	1,000
Service	200
Display	600
Concourse	<u>4,150</u>
Total	6,850
7. Upper Concourse	<u>11,250</u>
Seating	6,350
Concourse	4,400
Vertical Circulation	200
Washrooms	<u>300</u>
Total	11,250
8. Exit Stairs	<u>3,000</u>

PROGRAM - Continued

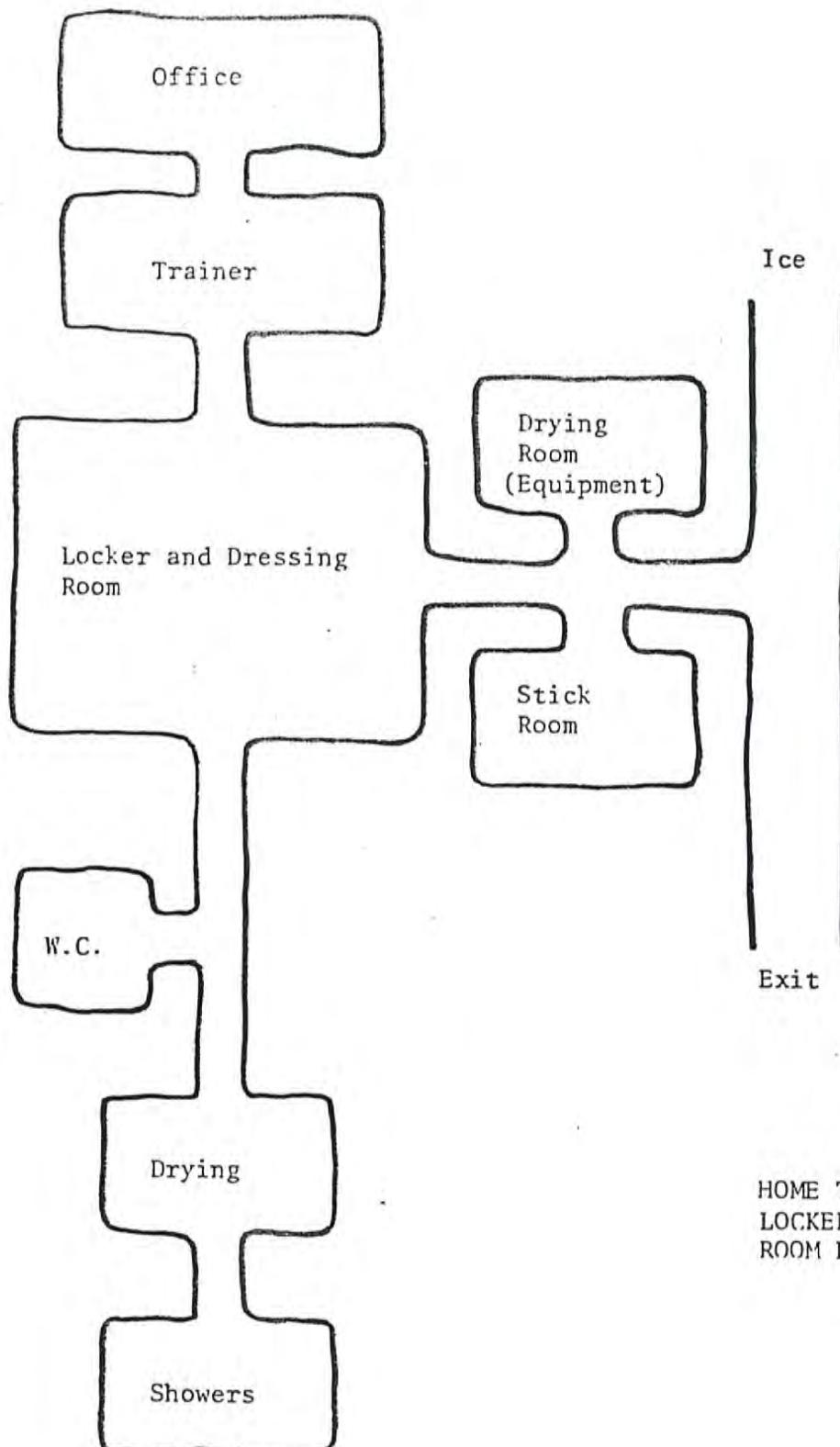
SQUARE METRES

SUMMATION OF AREAS

Parking	15,500
Entry Level	10,500
Commercial Level	14,800
Ice Level	13,700
Lower Concourse	6,550
Main Concourse	6,850
Upper Concourse	11,250
Exit Stairs	<u>3,000</u>
Total	<u><u>82,150</u></u>

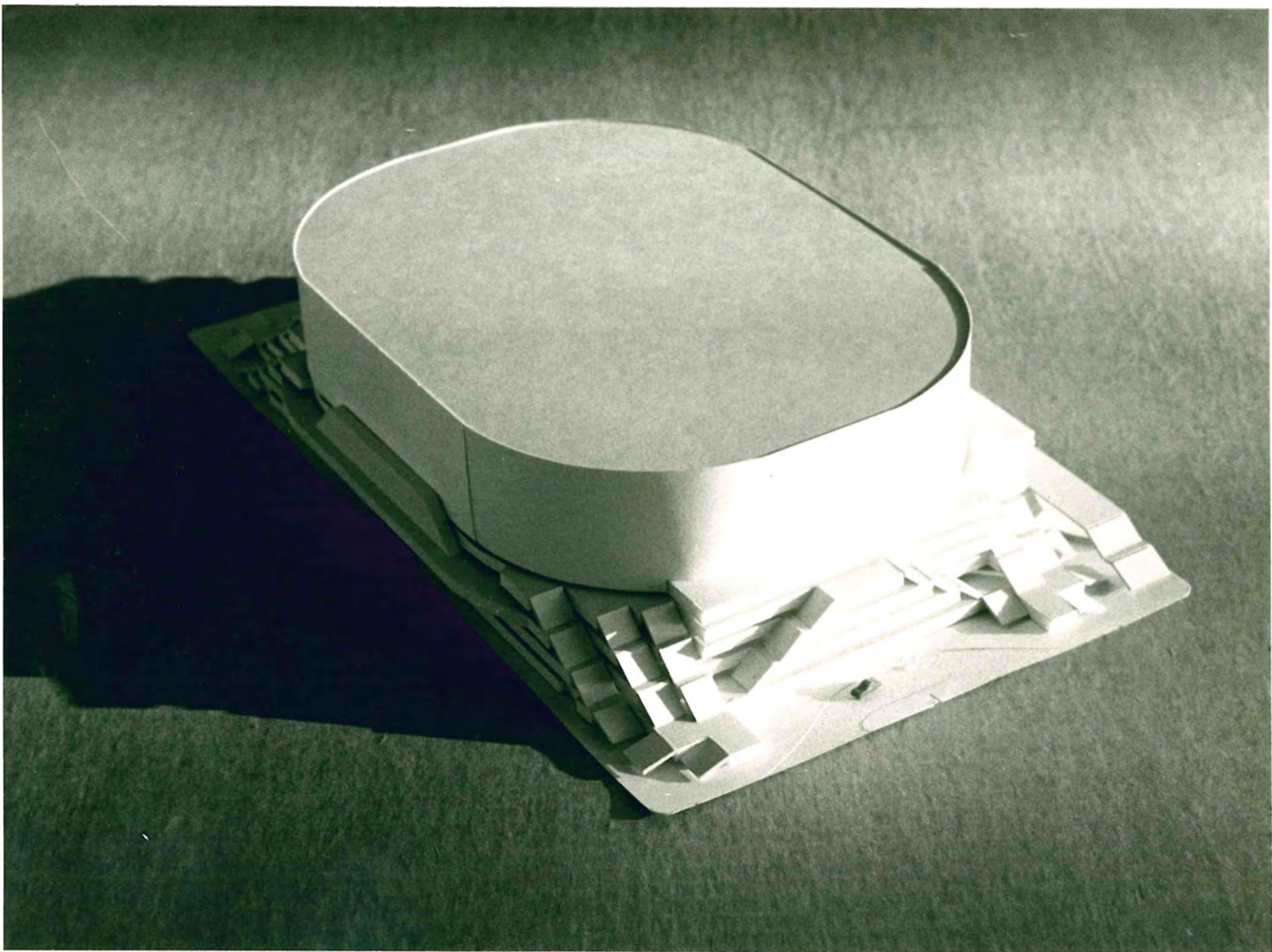


ICE LEVEL DESCRIPTION



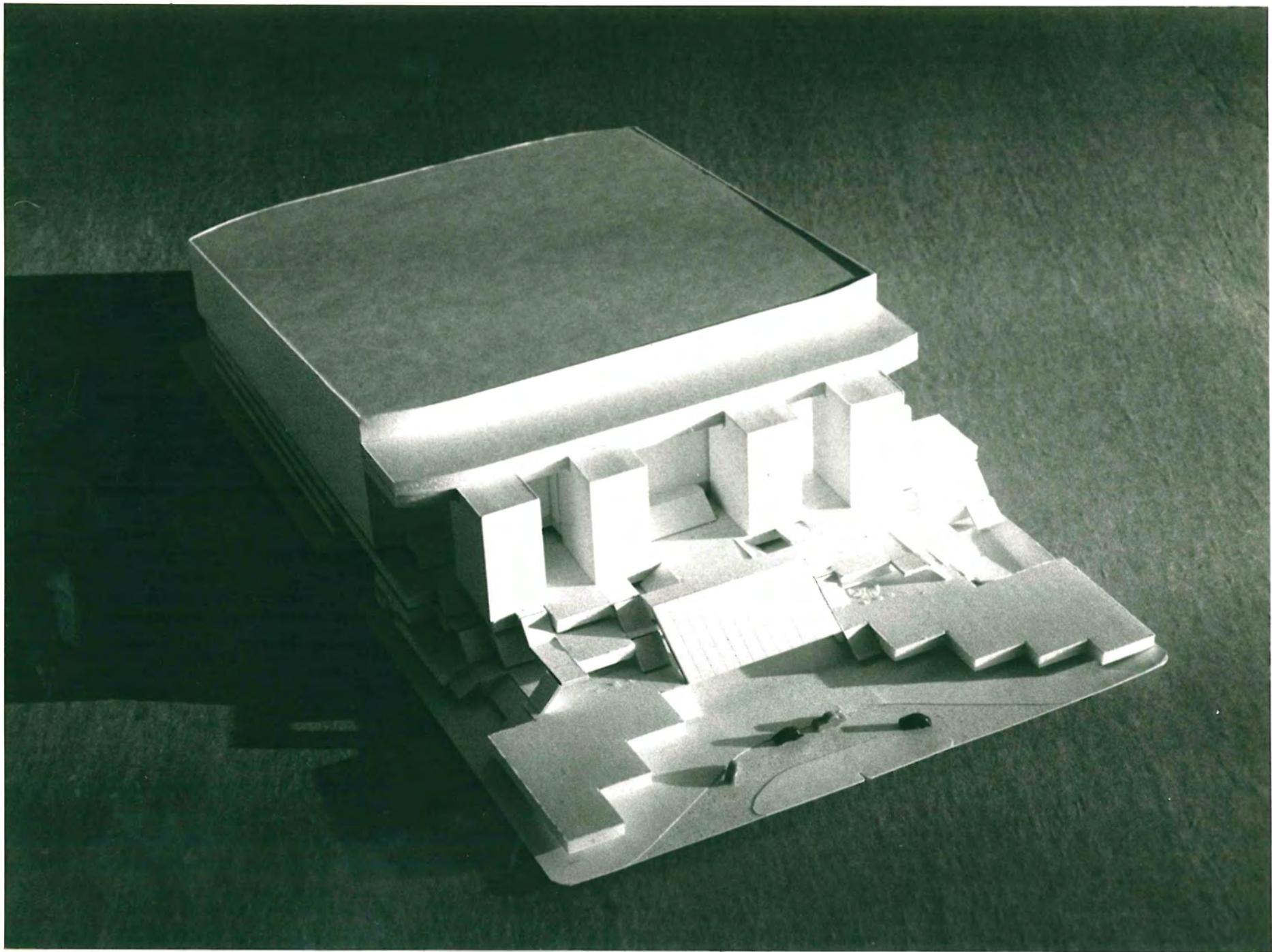
HOME TEAM HOCKEY
LOCKER AND DRESSING
ROOM DESCRIPTION

Problem Solution and Presentation

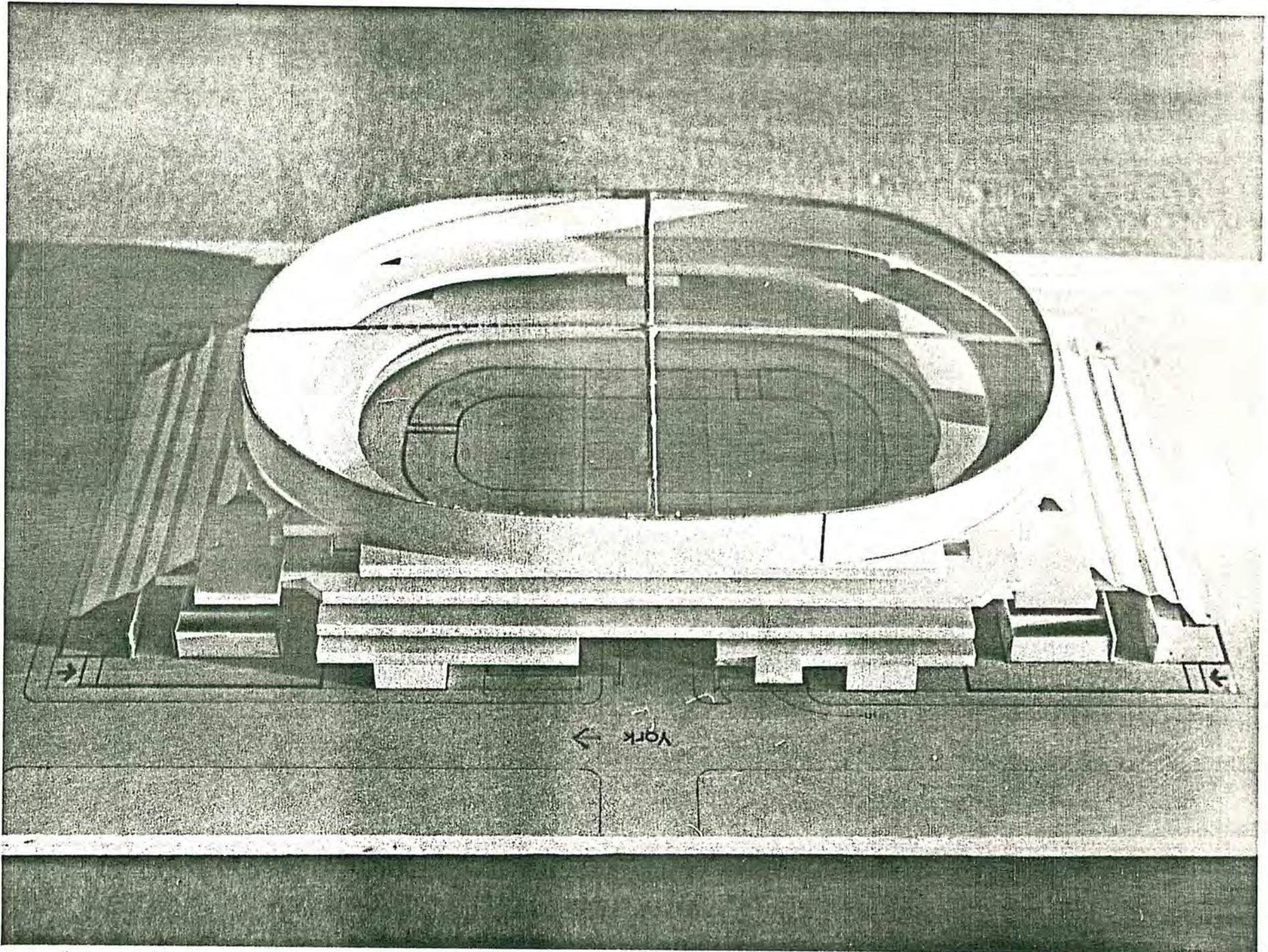


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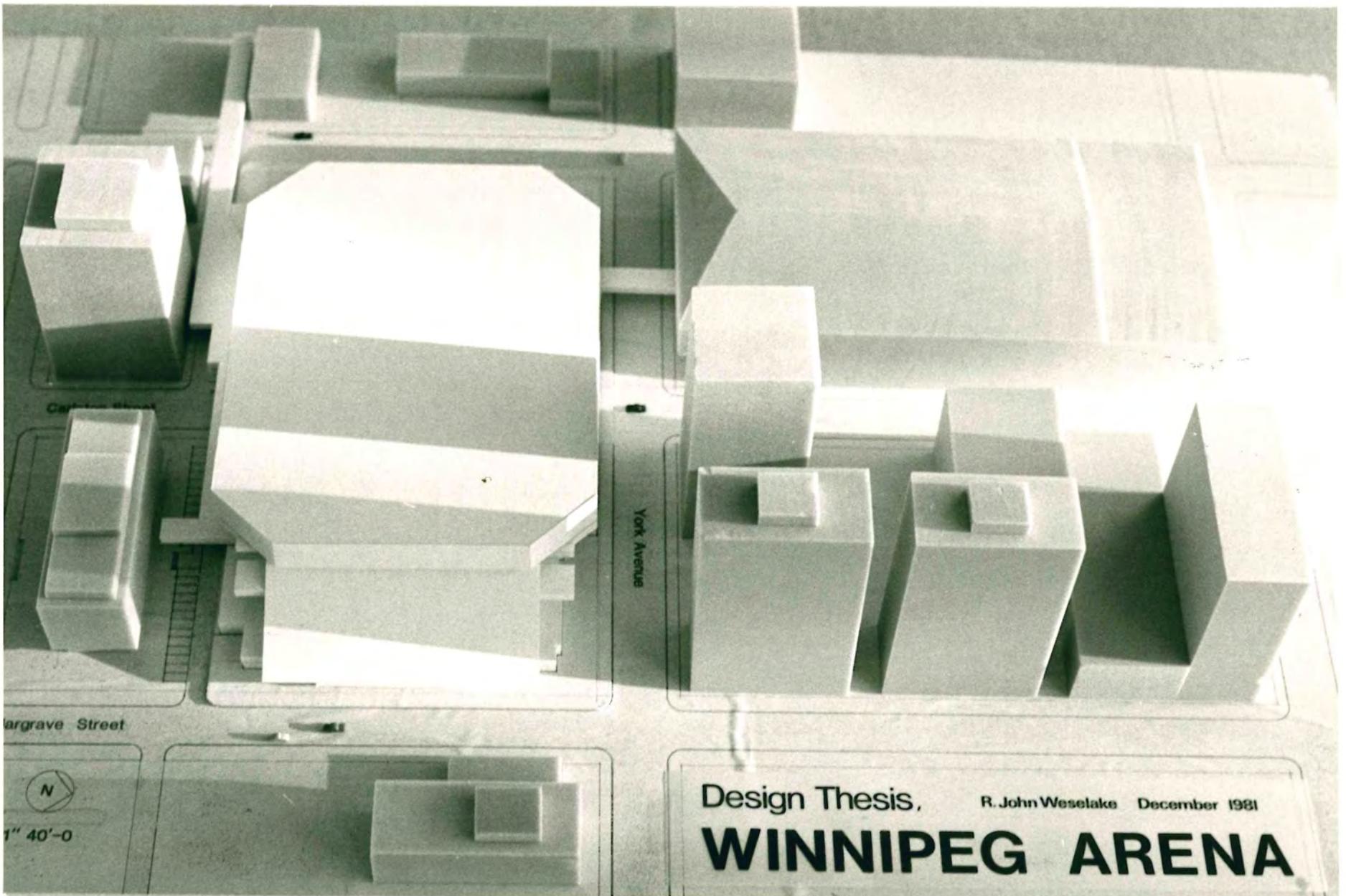
Form A



Form B



Development of Form A



Design Thesis.

R. John Weselake December 1981

WINNIPEG ARENA

Final Solution of Form A

PROBLEM SOLUTION

Parking Level

The required number of parking stalls are satisfied. The placement of parking below grade was chosen to avoid seeing a parking lot or parking structure. This allows the levels above parking for people oriented functions. Pay booths are placed inside the entrance of the parking to avoid traffic problems at the end of a game. Ample clearance in the parking is provided to accomodate small vans and the mechanical ducting.

Entry Level

This level is the main orientation and distribution level for people entering private or public areas. People will arrive by either bus or car. Two main passenger loading areas are located on each side of Carlton Street for local buses and shuttle buses. Car drop off points are at the front of the building. People using the parking garage gain access by elevator to the entry level and enter the Arena or continue on by elevator or escalator to the shopping mall/pedestrian system. A private special V.I.P. and players entry is on the lane side. Distribution of service goods for the Arena and shopping mall are from one main receiving area.

The box office and ticket booths have a secure passage-way connecting the north and south control areas. Administration connects directly by stair with the box office. Escalators in the Arena go directly from the entry level to the main concourse; except one set, which stops for the link with the Convention Centre. Internal circulation between main, upper and lower concourses is by corner stairs or elevators.

Commercial Level

A solution for this level is developed around the planned enclosed pedestrian system. Exit travel distance requirements for the rental units are met by incorporating rear service corridors and exits. A controlled circulation link is provided so the Convention Centre and Arena can function simultaneously on one event. In the middle section of this level a truss system is exposed to Carlton Street. This gives visual relief and interest when viewed from below.

Ice Level

Devoted primarily to private Arena functions except a small area for possible public shows next to the ice surface. Patrons have access onto the ice (shows, etc.) down aisles.

Lower Concourse

Public washrooms and amenities are located on this level. This concourse enhances the solution for the arena by providing a more secluded and human environment from the rest of the arena.

Main Concourse

A more typical solution of an Arena concourse by providing the main access to seating. Requirements for concessions, private boxes, media broadcasting and press box are incorporated into this level.

Upper Concourse

Serves as a secondary concourse level to help distribute intermission crowds. The remaining washroom needs are placed on this level.

Seating

Final seating count including boxes is 16,740.

ACOUSTICAL STUDY OF MAIN ARENA SPACE

A reasonably good reverberation time in a building of this volume at 500 cps would be 2.5 to 3.0 seconds with 50% occupancy. Most speech or music programs would probably have audiences in the 50% range.

Calculated Reverberation times:

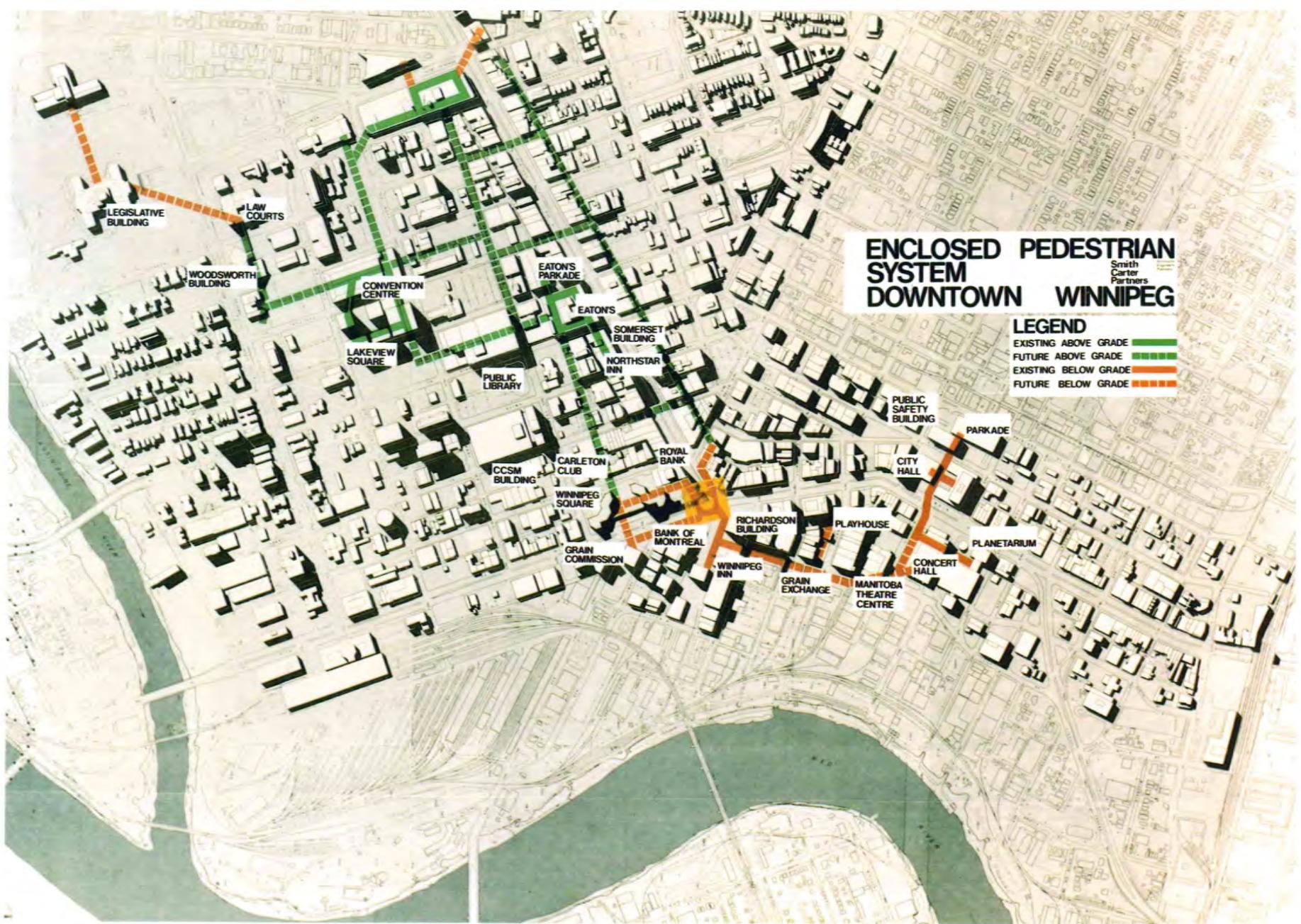
	125 cps	500 cps	2000 cps
Untreated, Fully Occupied	4.0	3.0	2.2
Untreated, 50% Occupied	6.6	4.6	3.3
Addition of Sonoboads, 50% Occupied	3.2	2.8	2.2

Existing Conditions:

- A decrease in reverberation time needed for 50% occupied at 500 cps.
- Bring the low 125 cps and the high 2000 cps closer to each in reverberation time.
- Correct echo and flutter echo conditions.
- A need for controlled reinforcement and distribution of sound because of the large volume.

Control:

- Random placement on concrete block wall surface 16,000 sq. ft. of 3/4 inch Sonoboard.
- Suspend close to the ceiling 16,700 sq. ft. of Sonoboard panels around perimeter of the arena space. This will diffuse rear wall echoes and side wall flutter echoes.
- Provide a focusing shell to reinforce and distribute sound for stage events.
- Suspend an acoustical canopy for control of front ceiling echoes.
- Incorporate many small more directional speakers for general arena events.



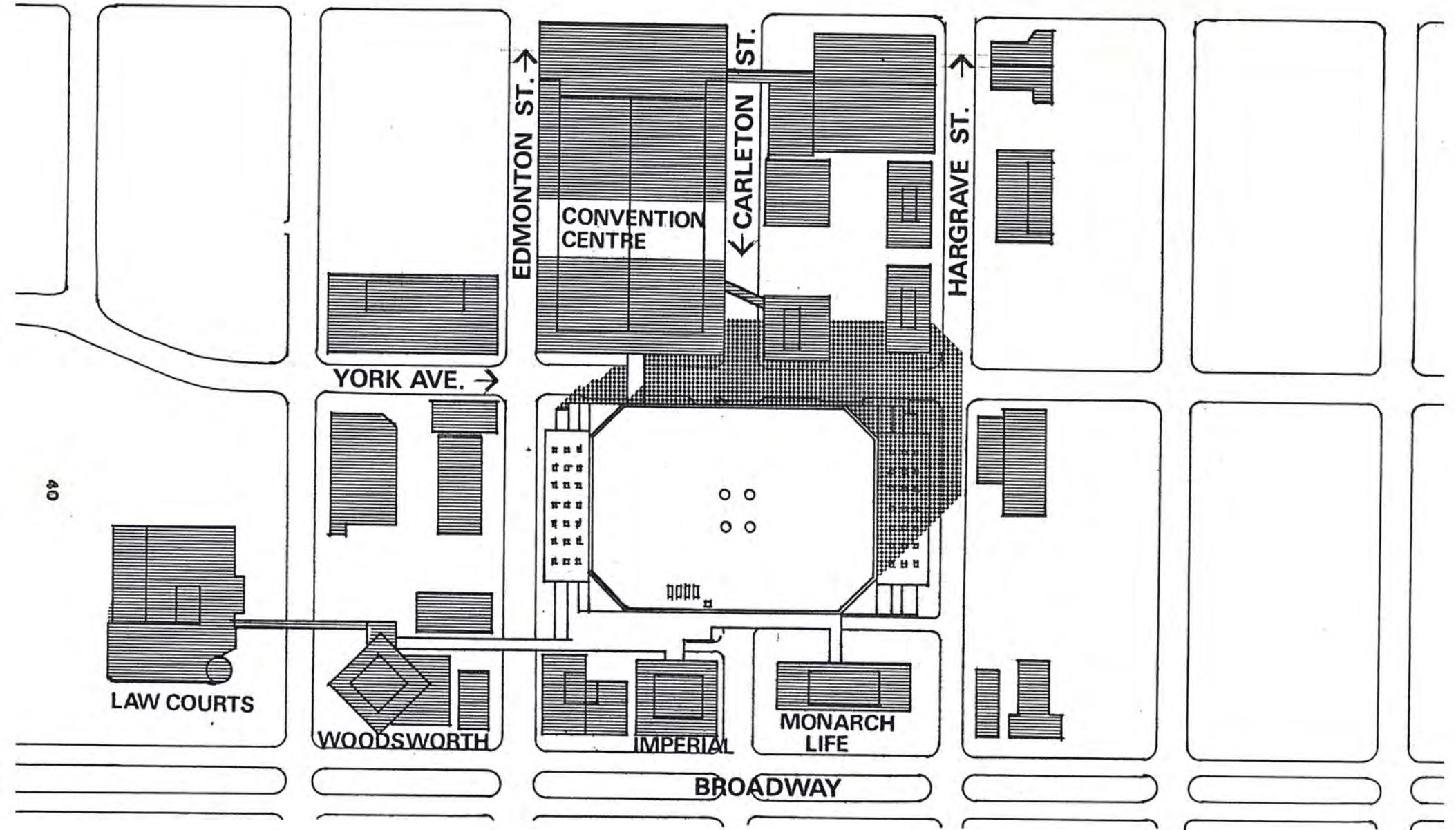
WINNIPEG'S EMERGING DOWNTOWN PEDESTRIAN SYSTEM





Winnipeg
Convention
Centre

66



SITE PLAN

WINNIPEG ARENA

0 30 60 120 M

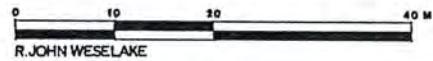
R. JOHN WESELAKE





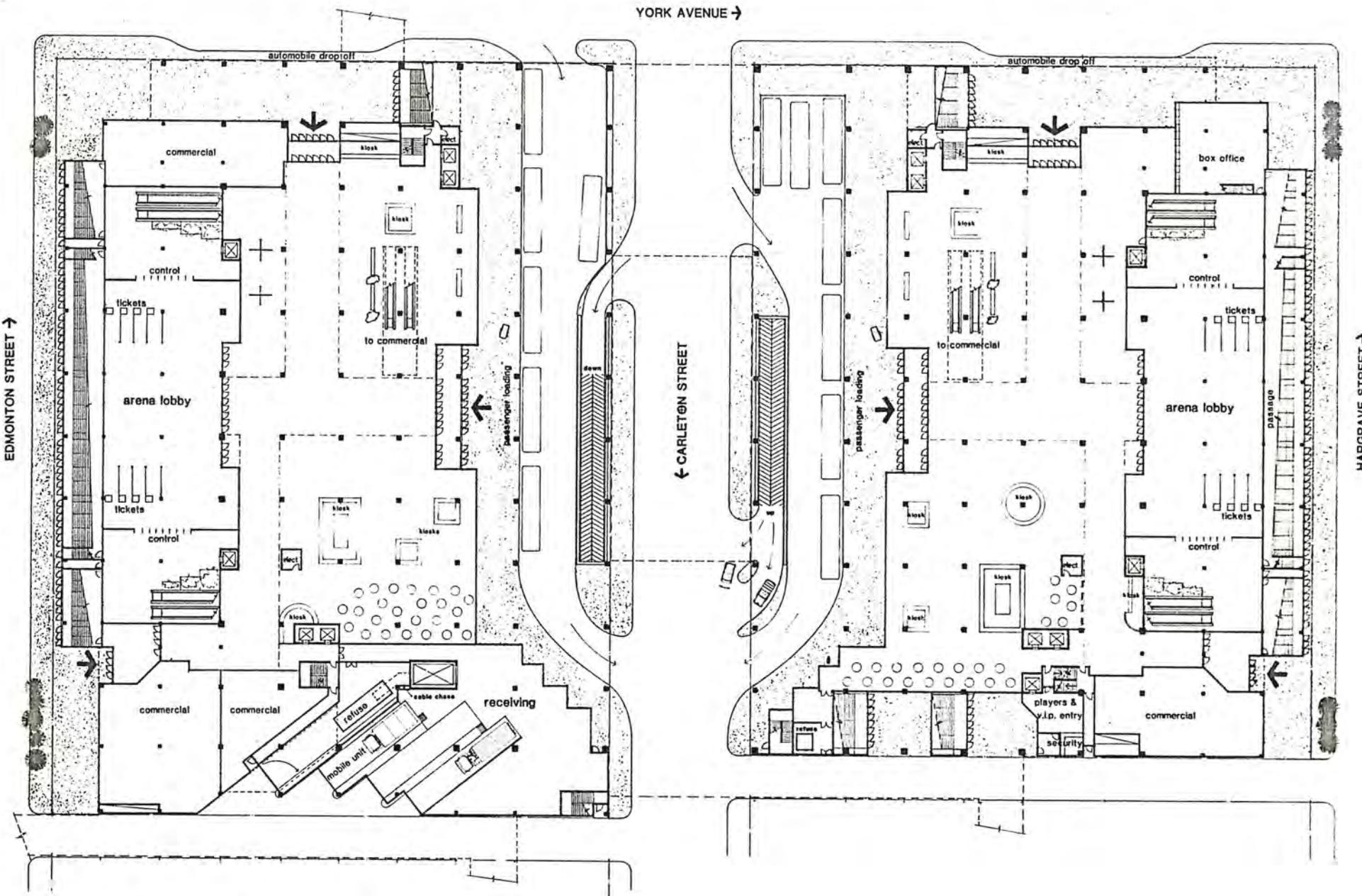
-3.048 PARKING LEVEL 431 parking stalls

WINNIPEG ARENA



R.JOHN WESELAKE



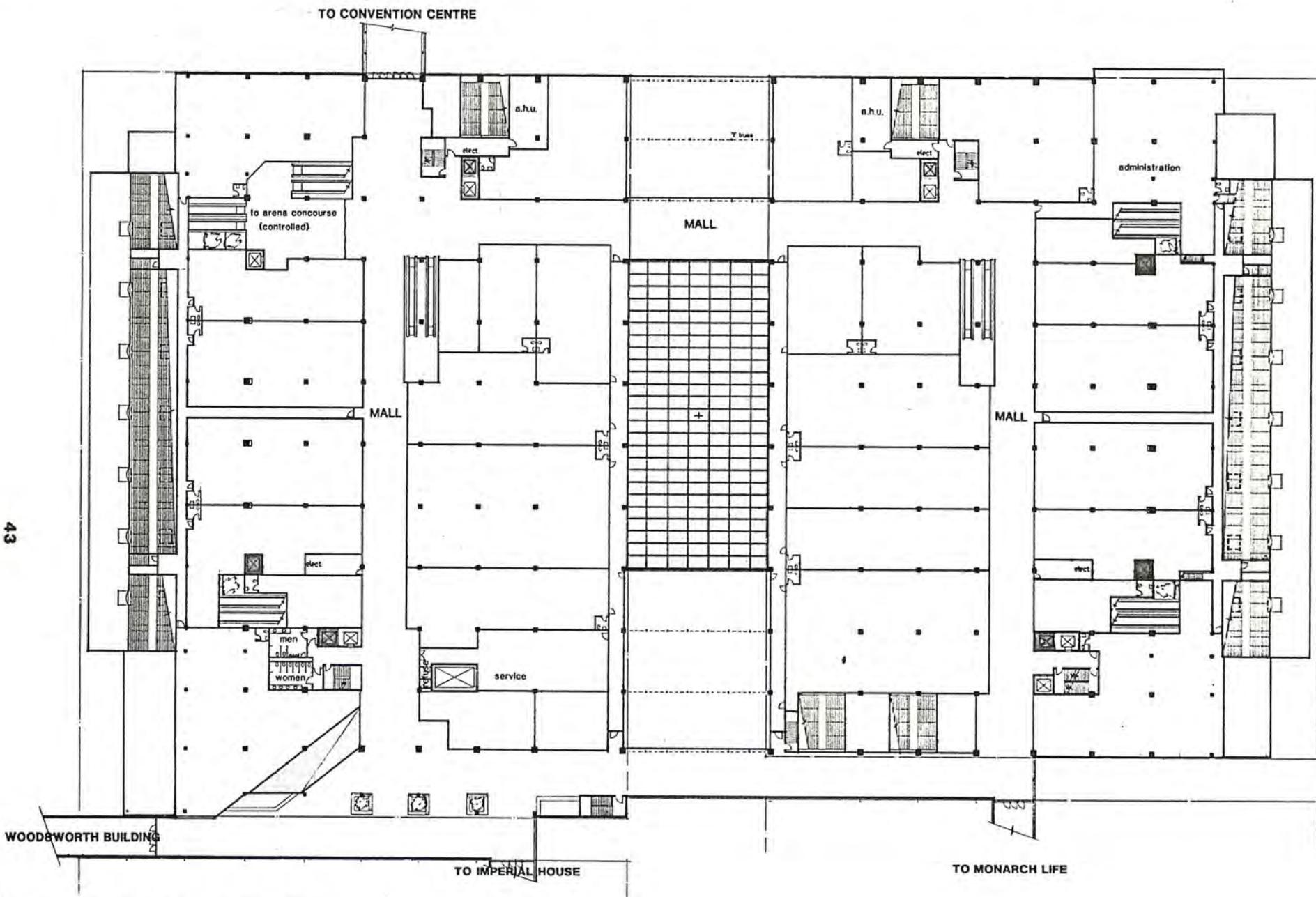


WINNIPEG ARENA

R.JOHN WESELAKE

December 17, 1981



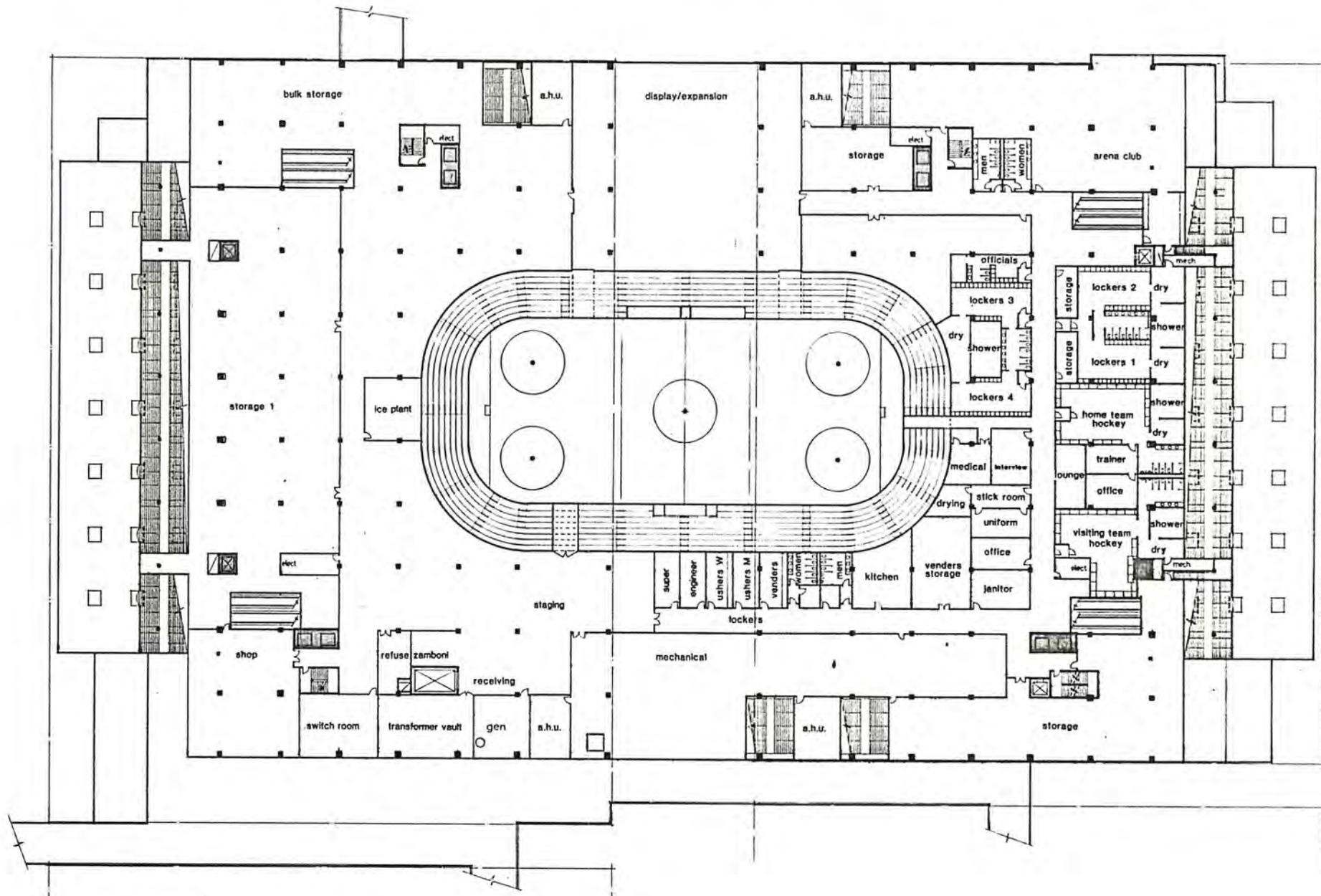


5.500 COMMERCIAL LEVEL

WINNIPEG ARENA

0 10 20 30 40 M
R.JOHN WESELAKE



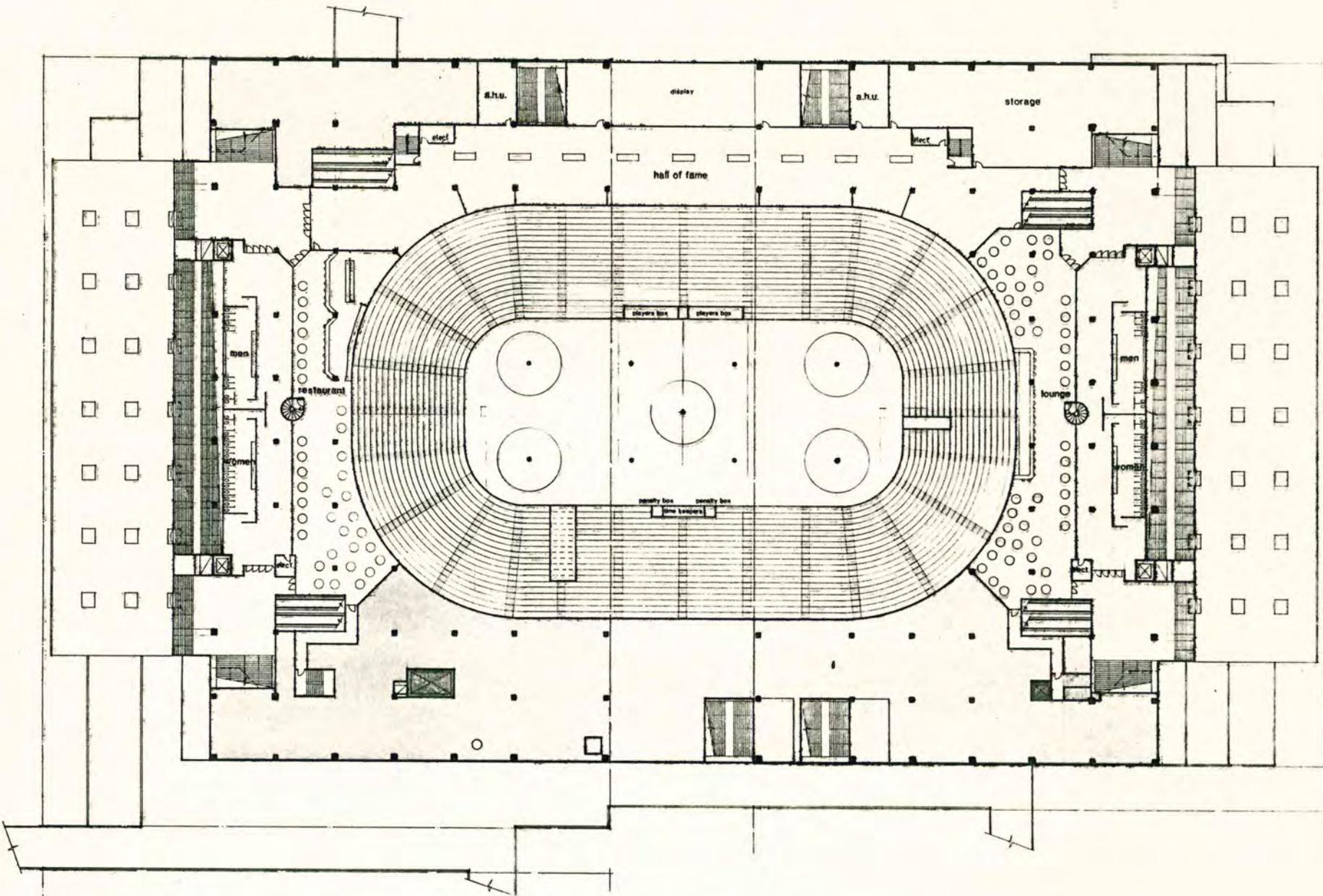


9.100 ICE LEVEL

WINNIPEG ARENA



R.JOHN WESELAKE

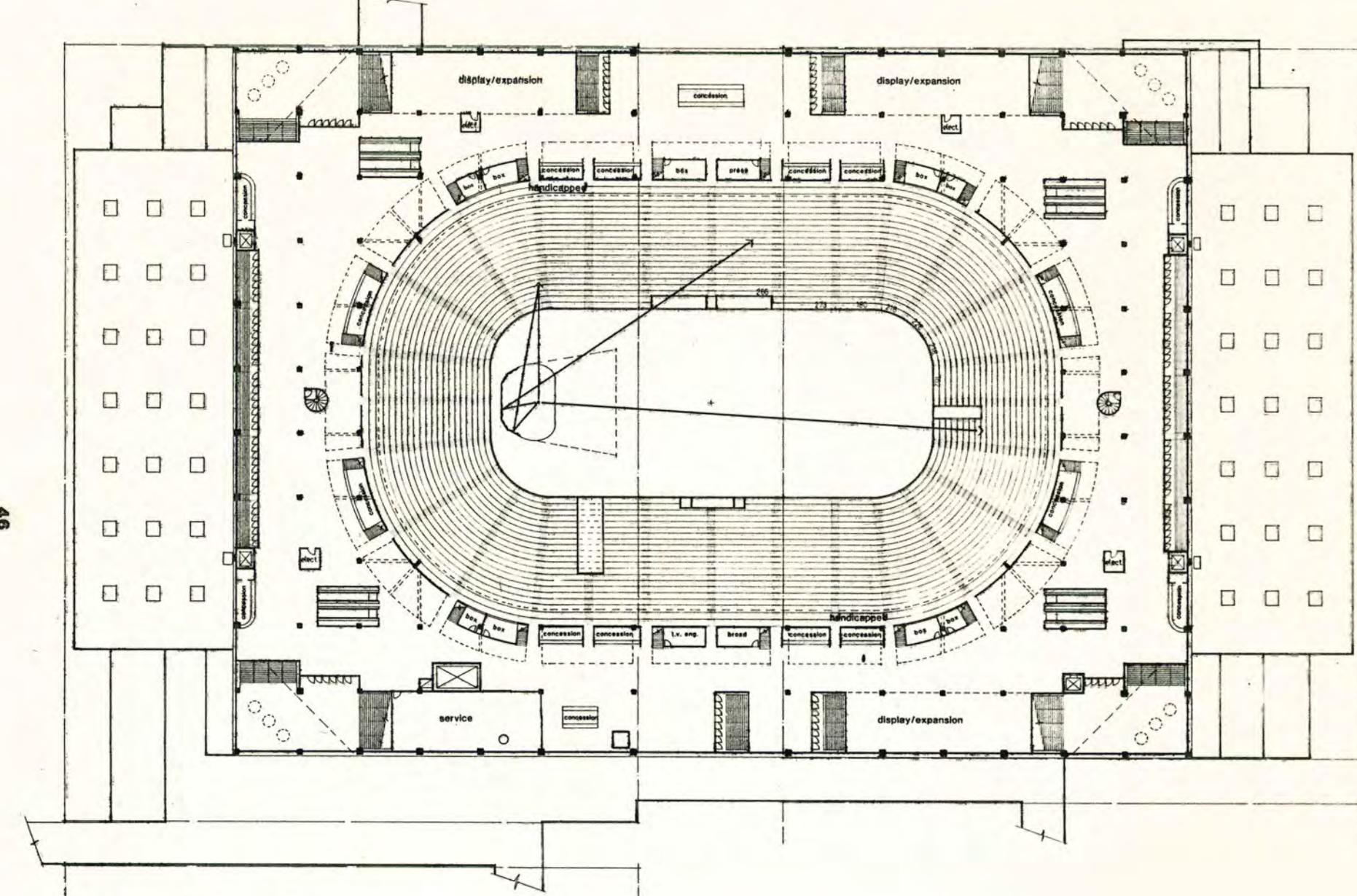


12,700 LOWER CONCOURSE LEVEL

WINNIPEG ARENA

0 10 20 40 M
R. JOHN WESELAKE



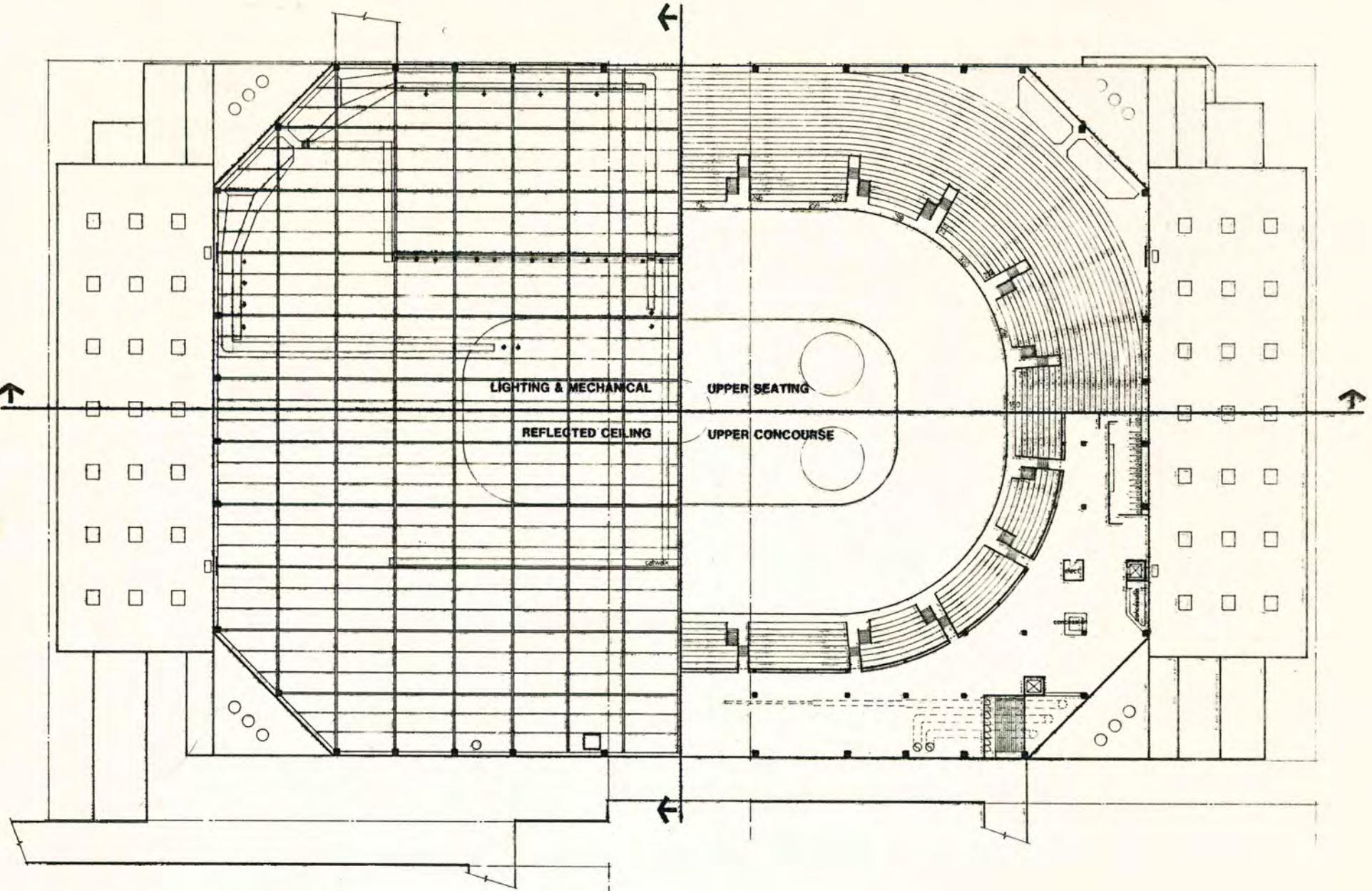


16.300 MAIN CONCOURSE LEVEL

WINNIPEG ARENA

10 20 40 M
R. JOHN WESELAKE



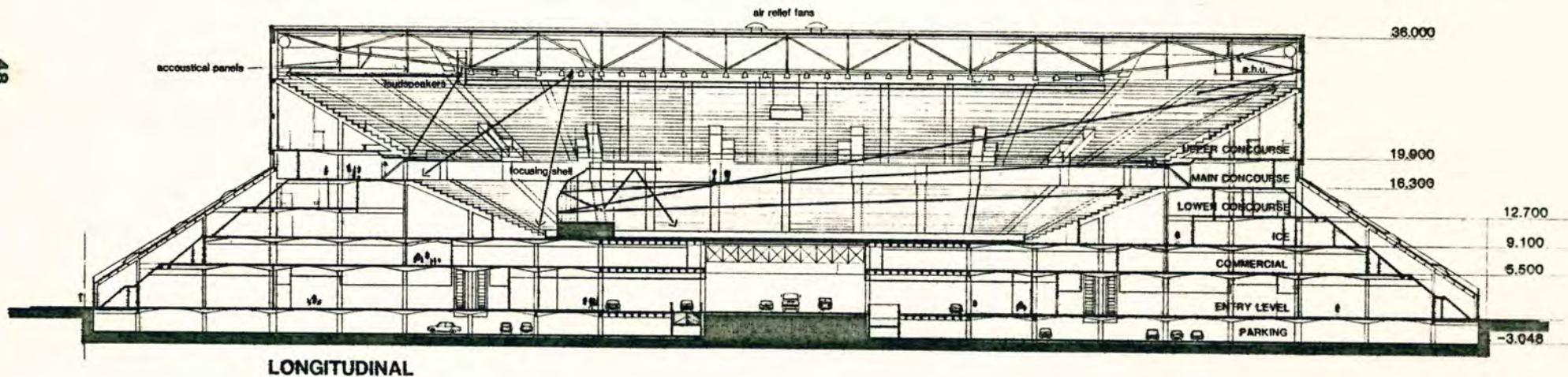
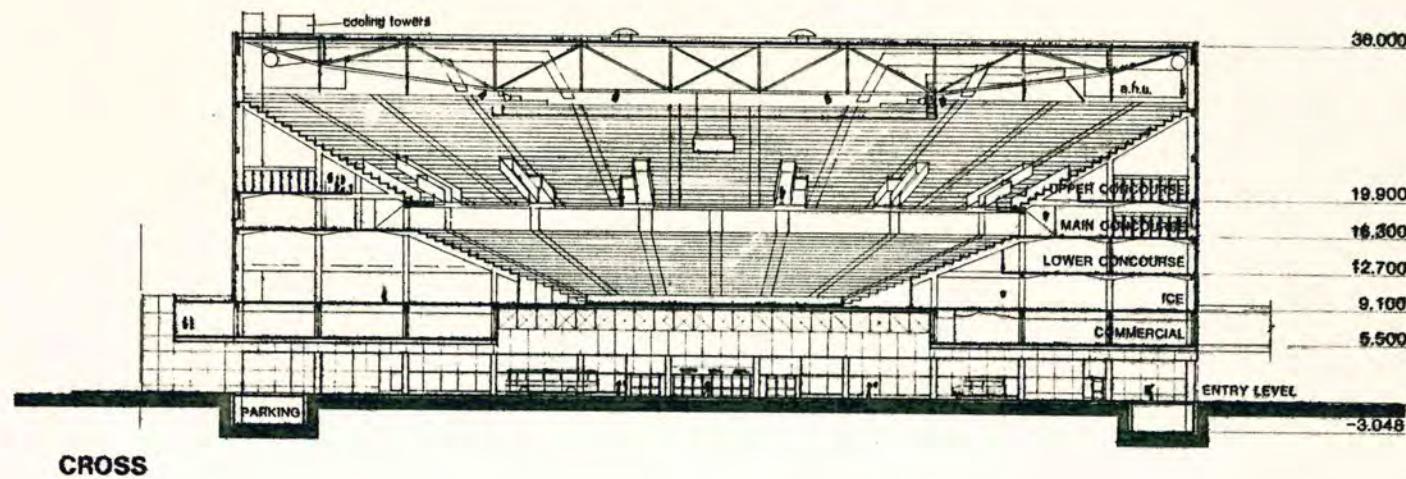


19.900 UPPER CONCOURSE LEVEL

WINNIPEG ARENA



R.JOHN WESELAKE

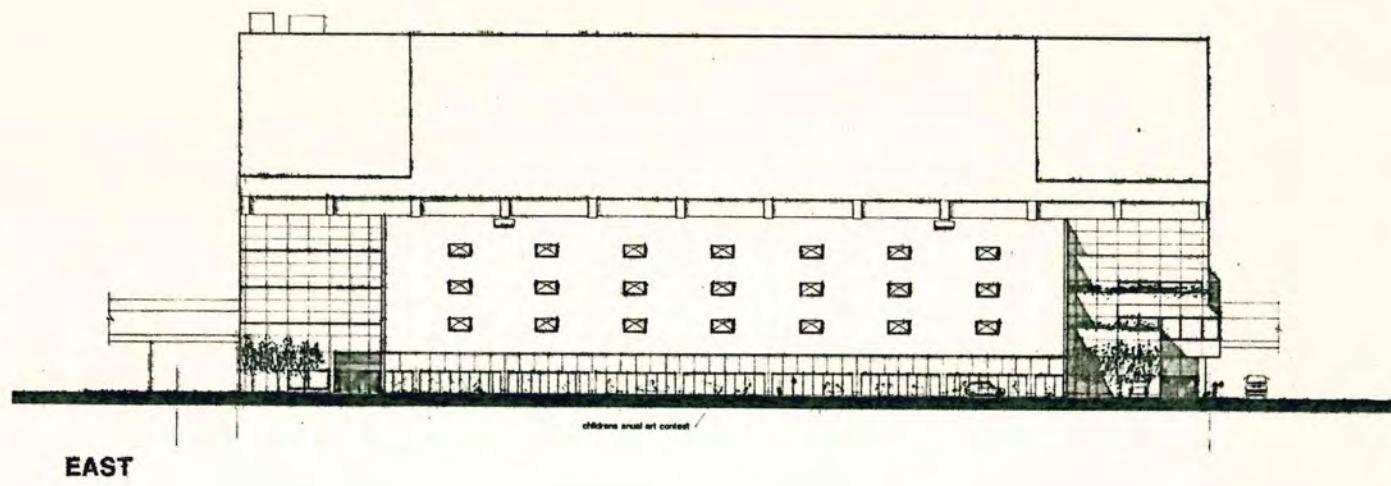


SECTIONS

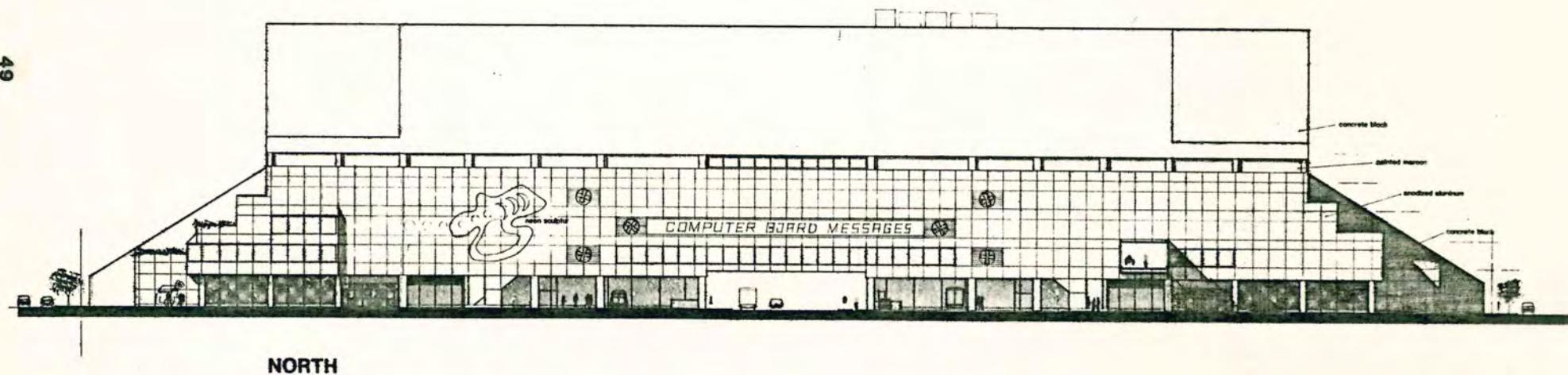
WINNIPEG ARENA



R.JOHN WESELAKE



EAST

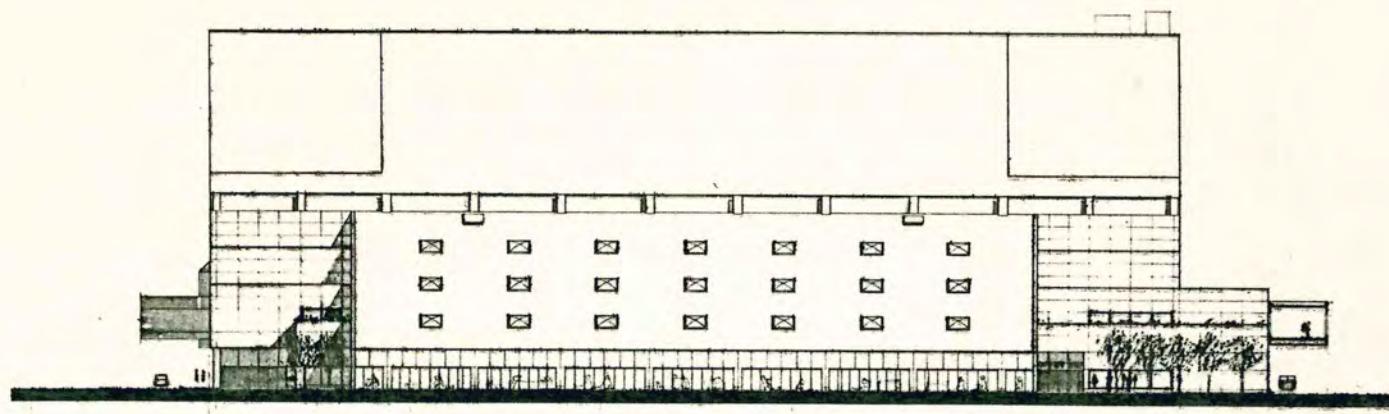


NORTH

ELEVATIONS

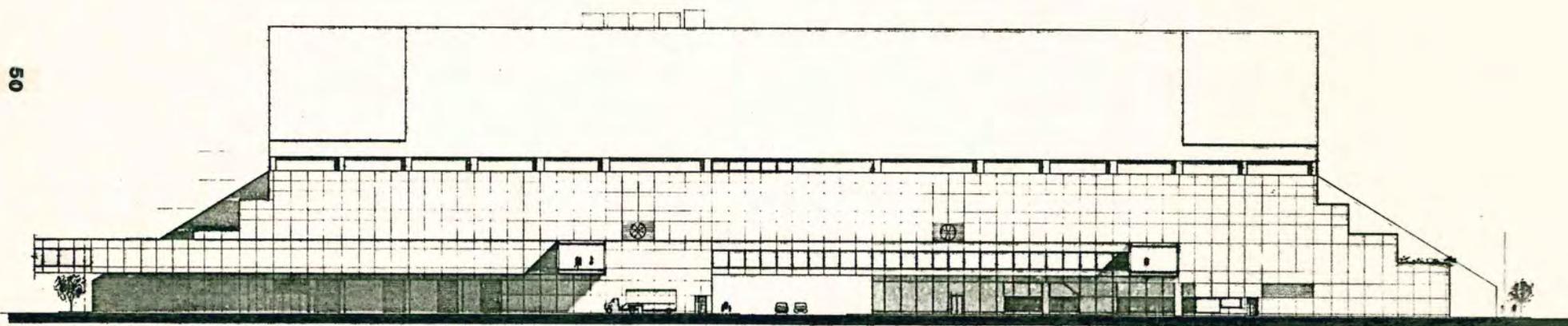
WINNIPEG ARENA

0 10 20 40 M
R.JOHNSON WESELAKE



WEST

50



SOUTH

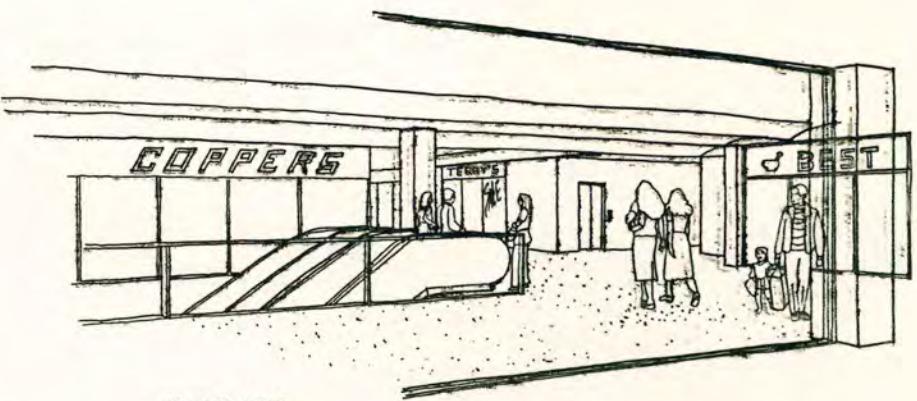
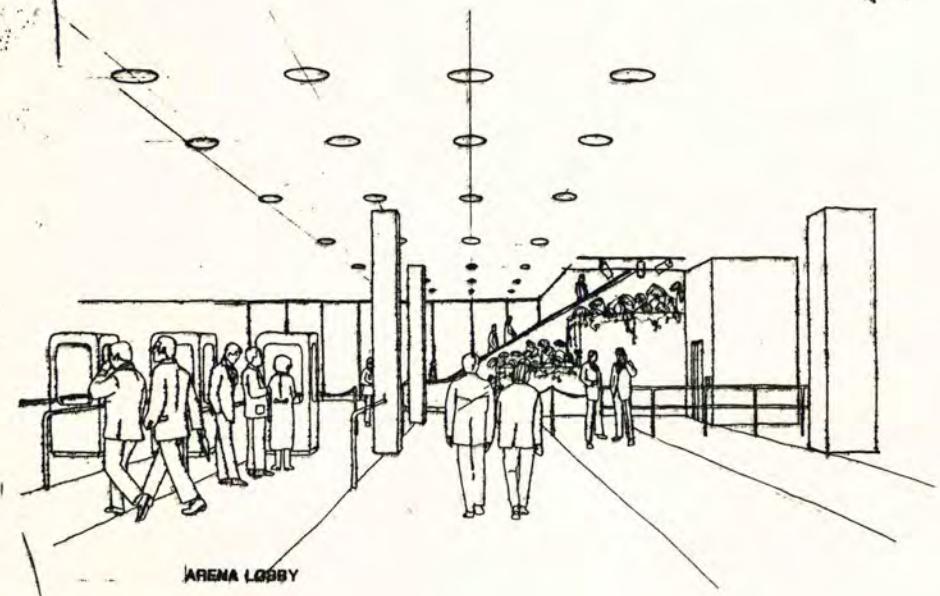
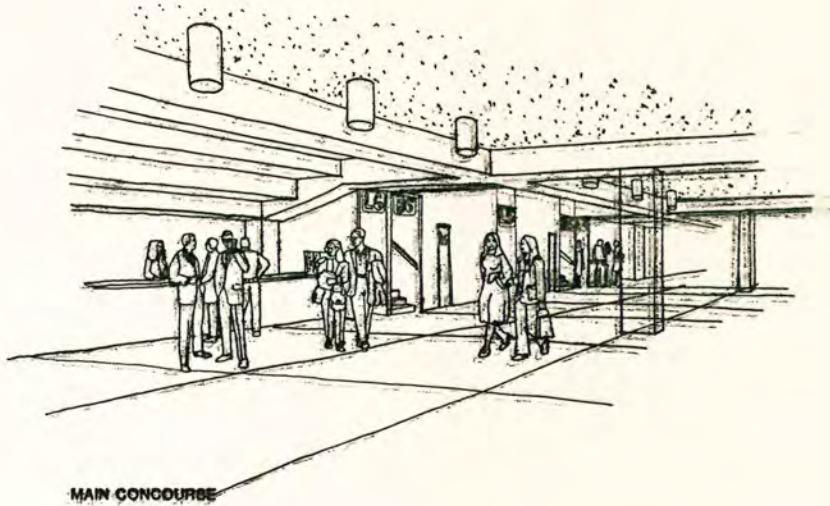
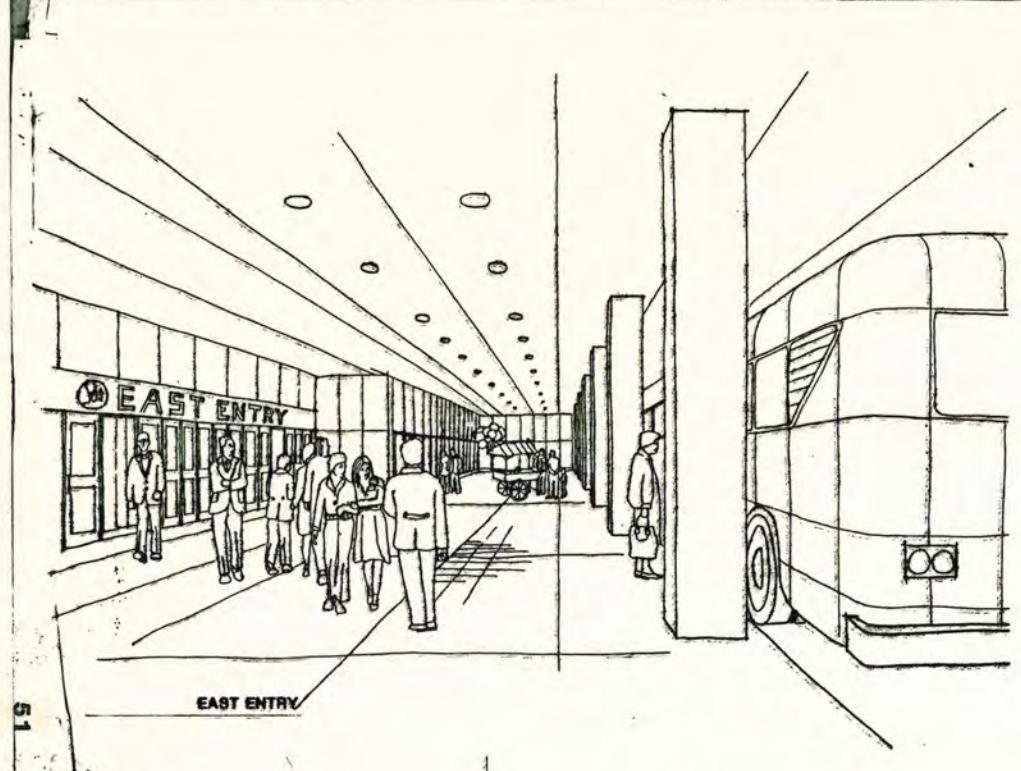
ELEVATIONS

WINNIPEG ARENA

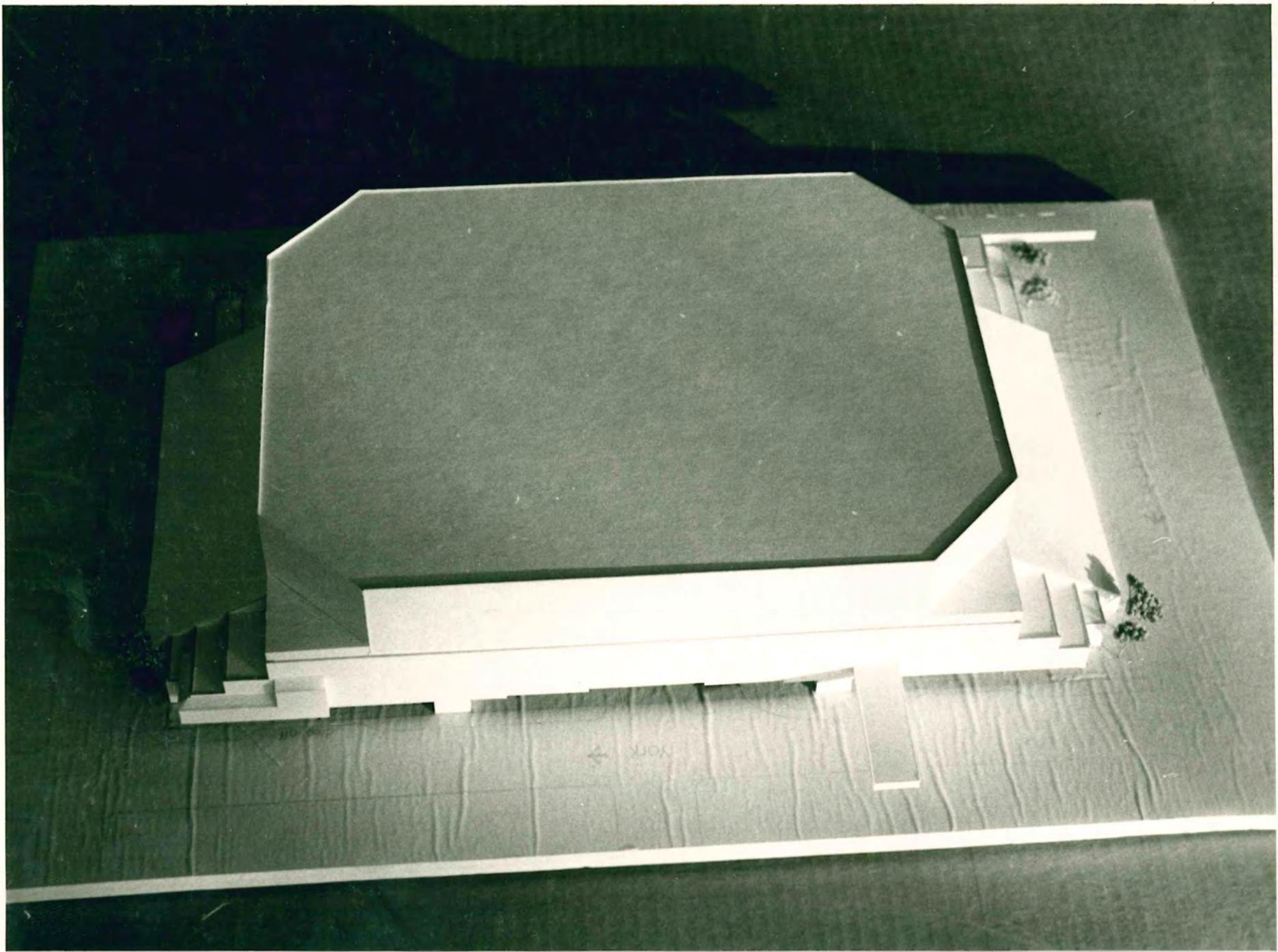


R. JOHN WESELAKE





R.JOHN WESELAKE

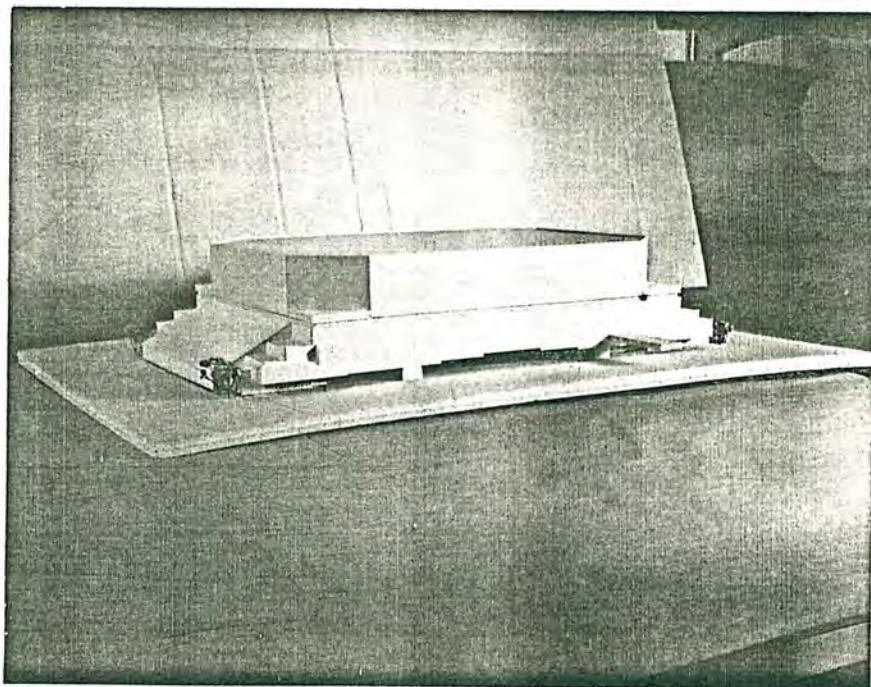


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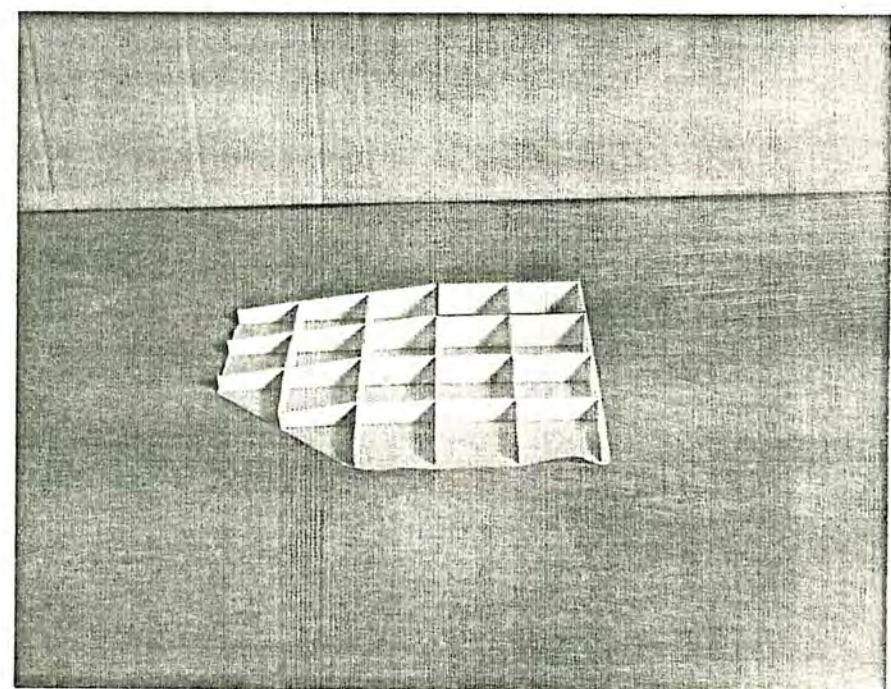
Model



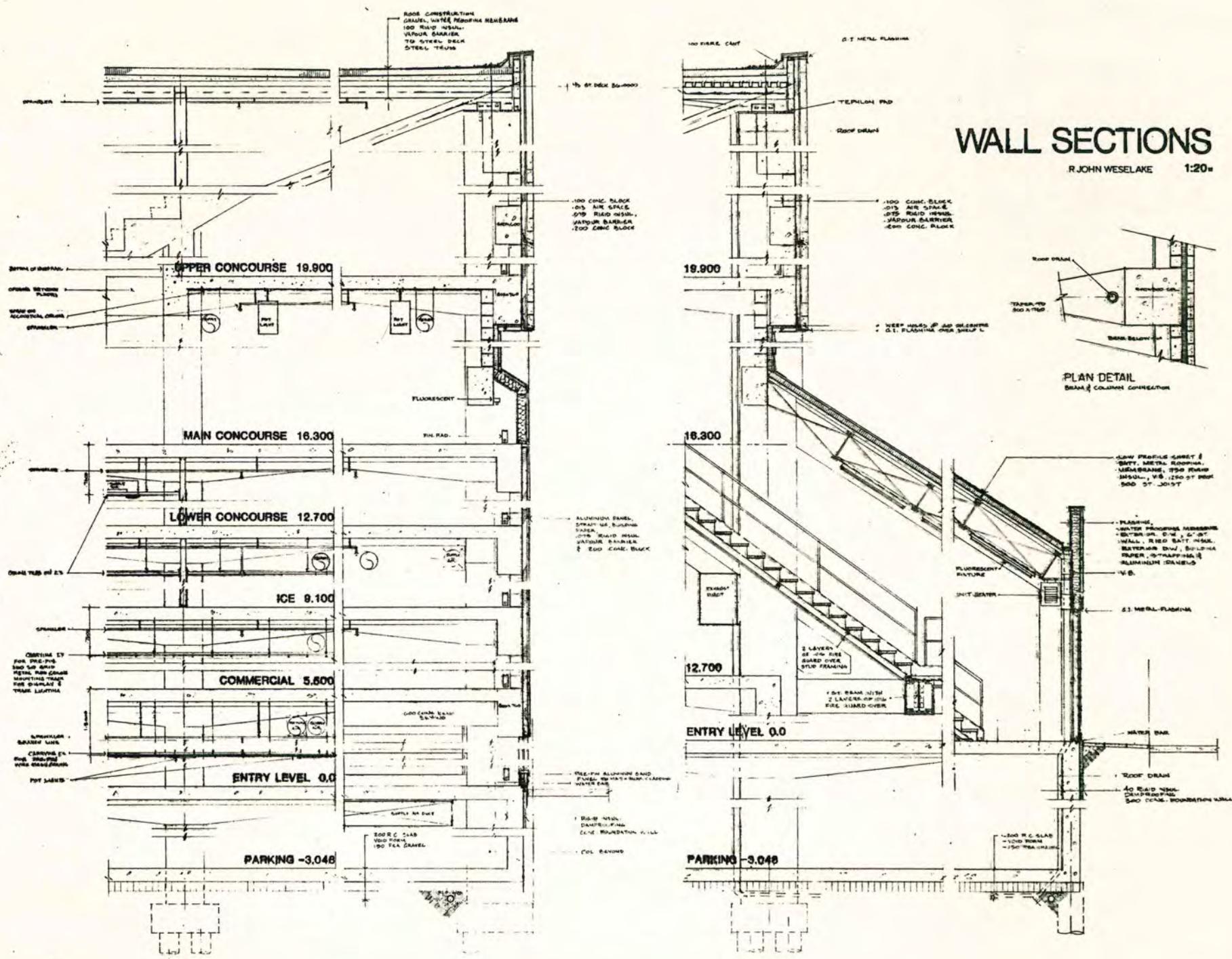
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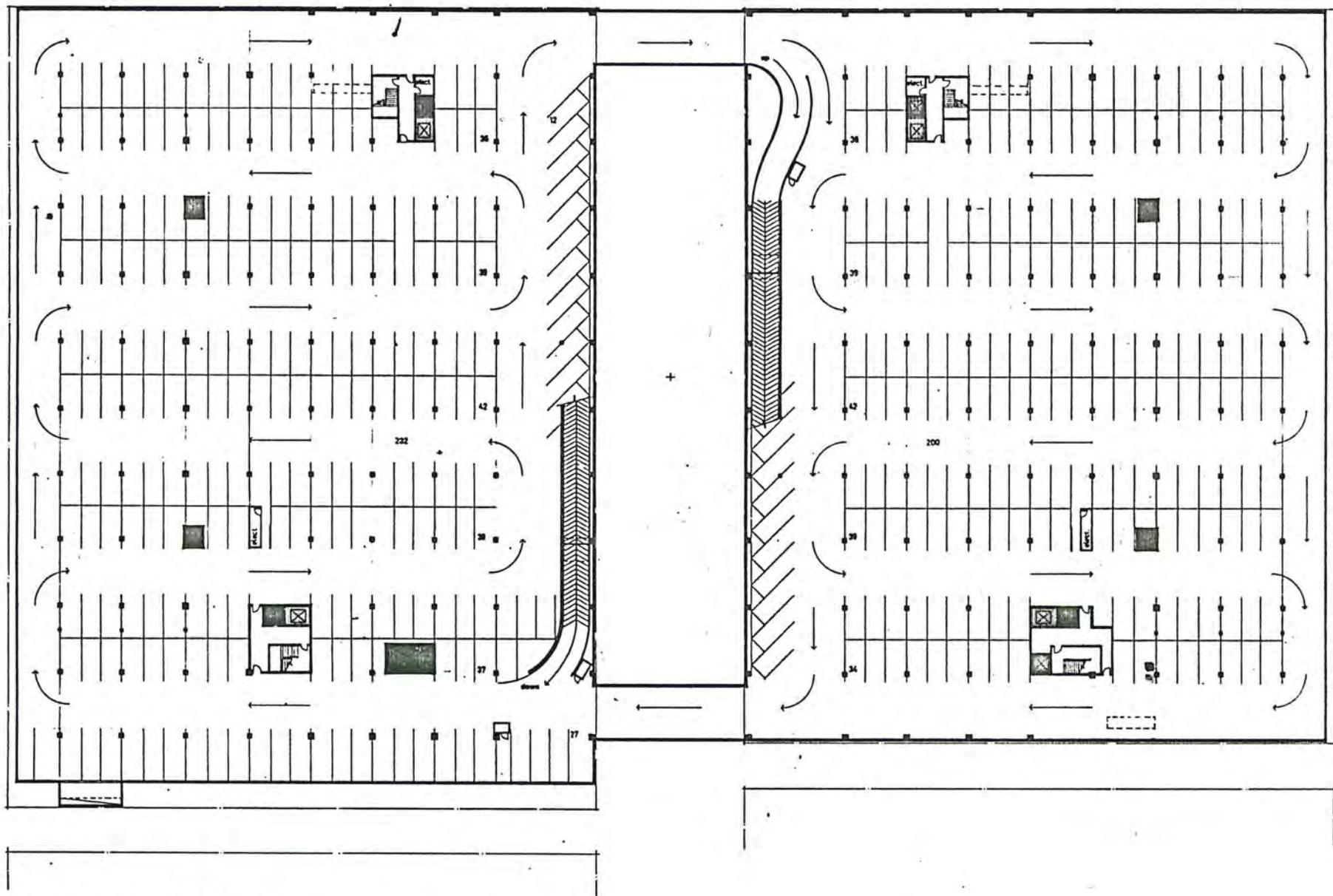
Model



Corner of Roof Truss



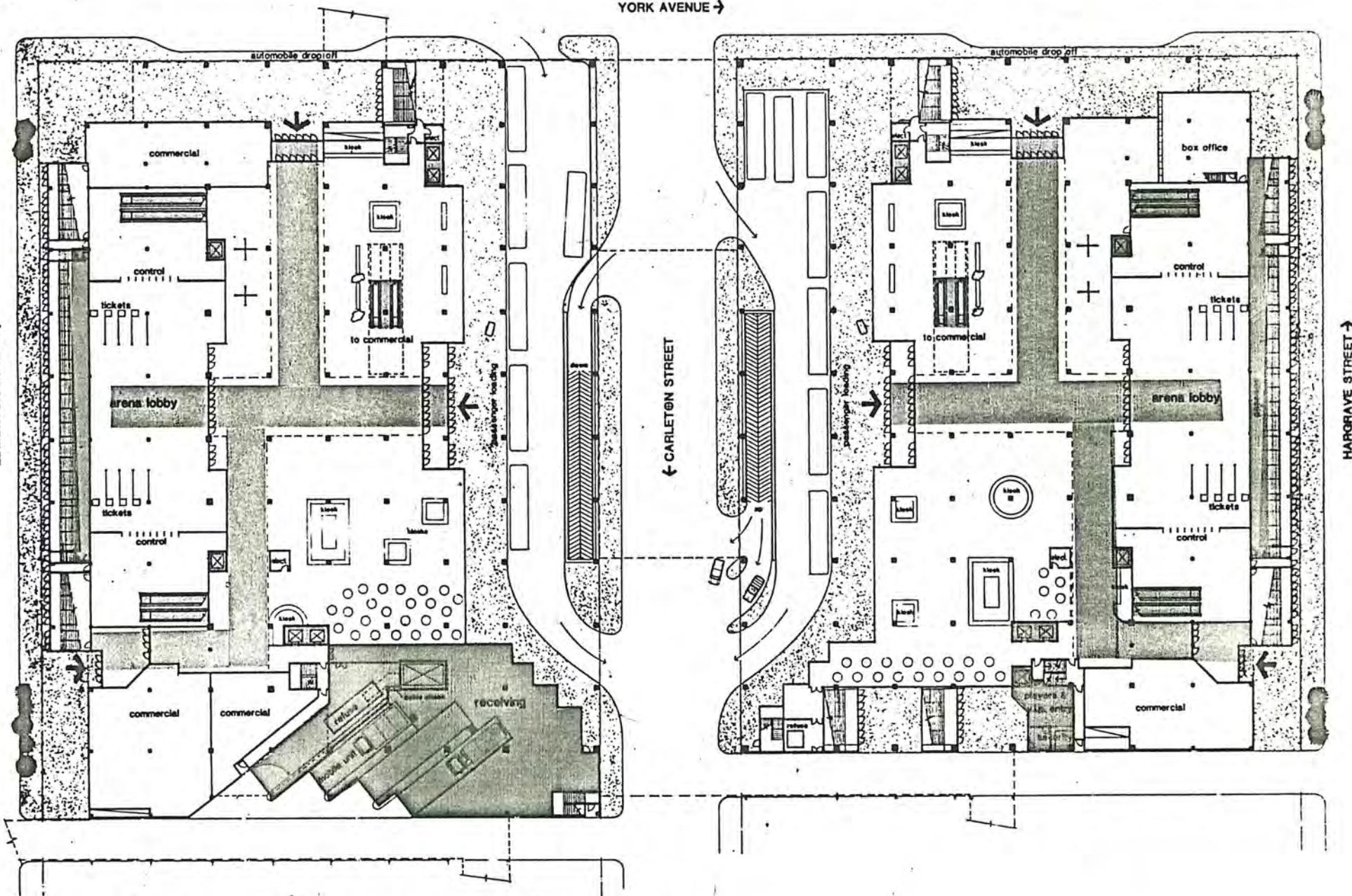
Circulation, Mechanical and Plumbing

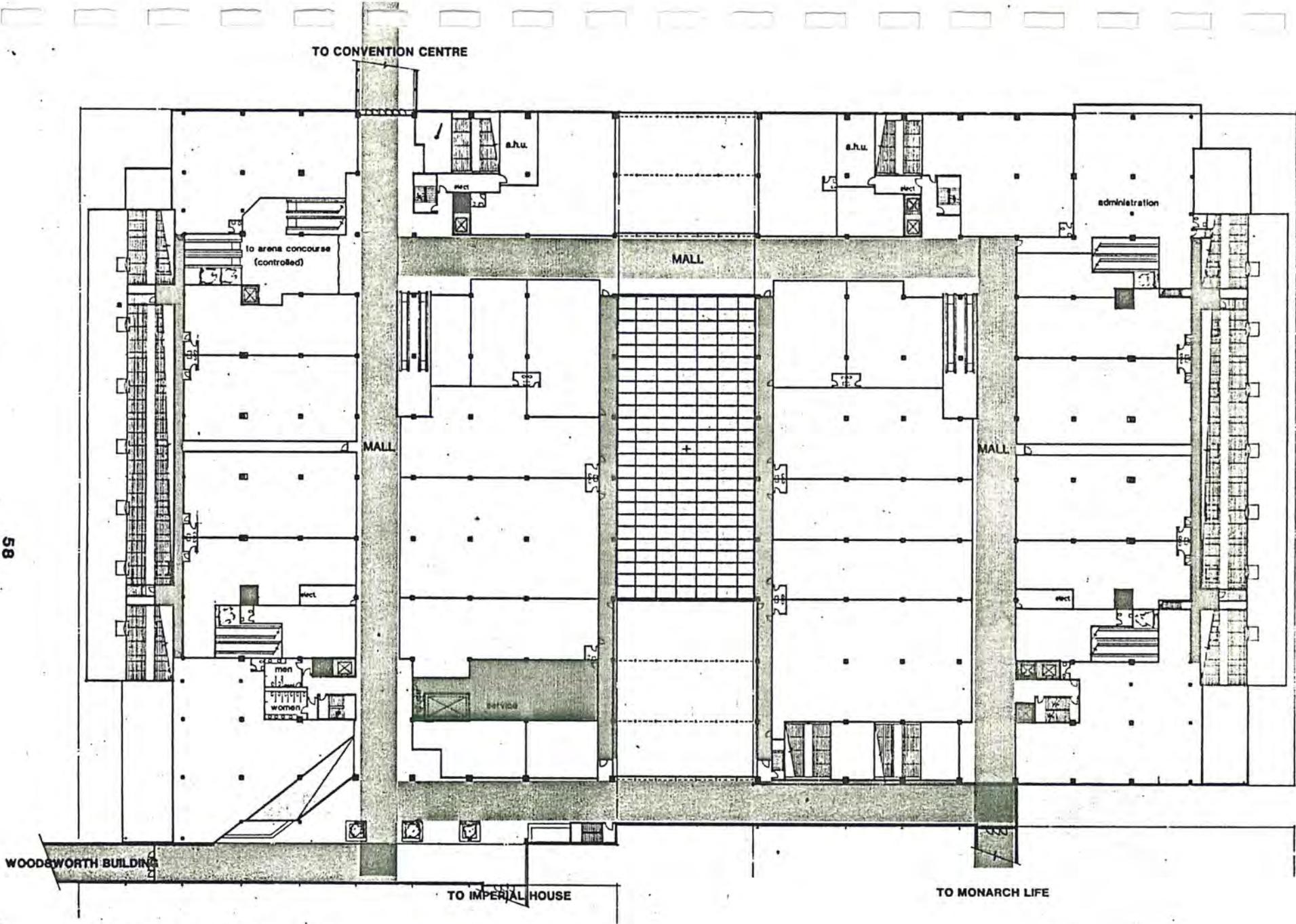


-3.048 PARKING LEVEL 432 parking stalls

WINNIPEG ARENA



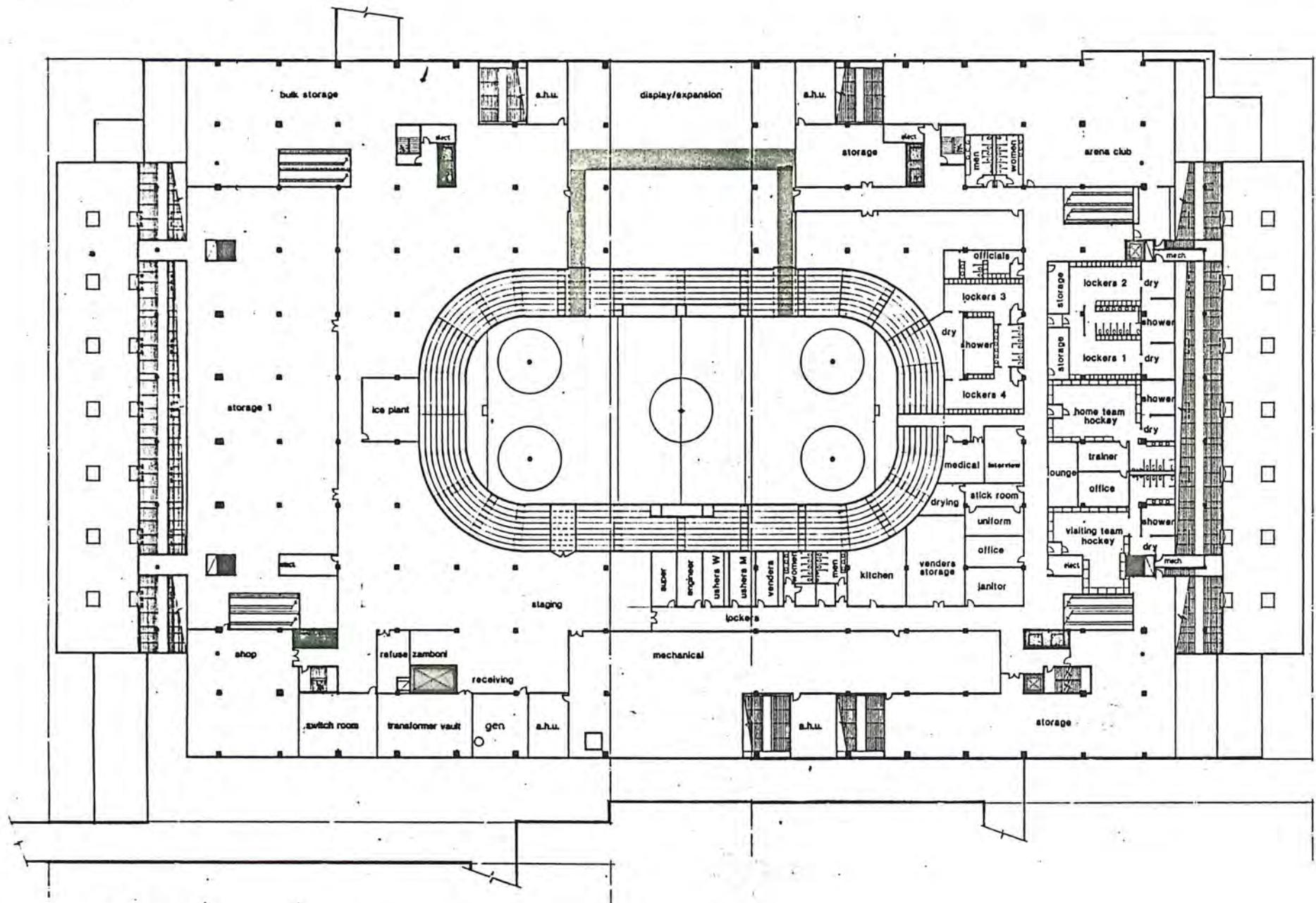




5.500 COMMERCIAL LEVEL

WINNIPEG ARENA



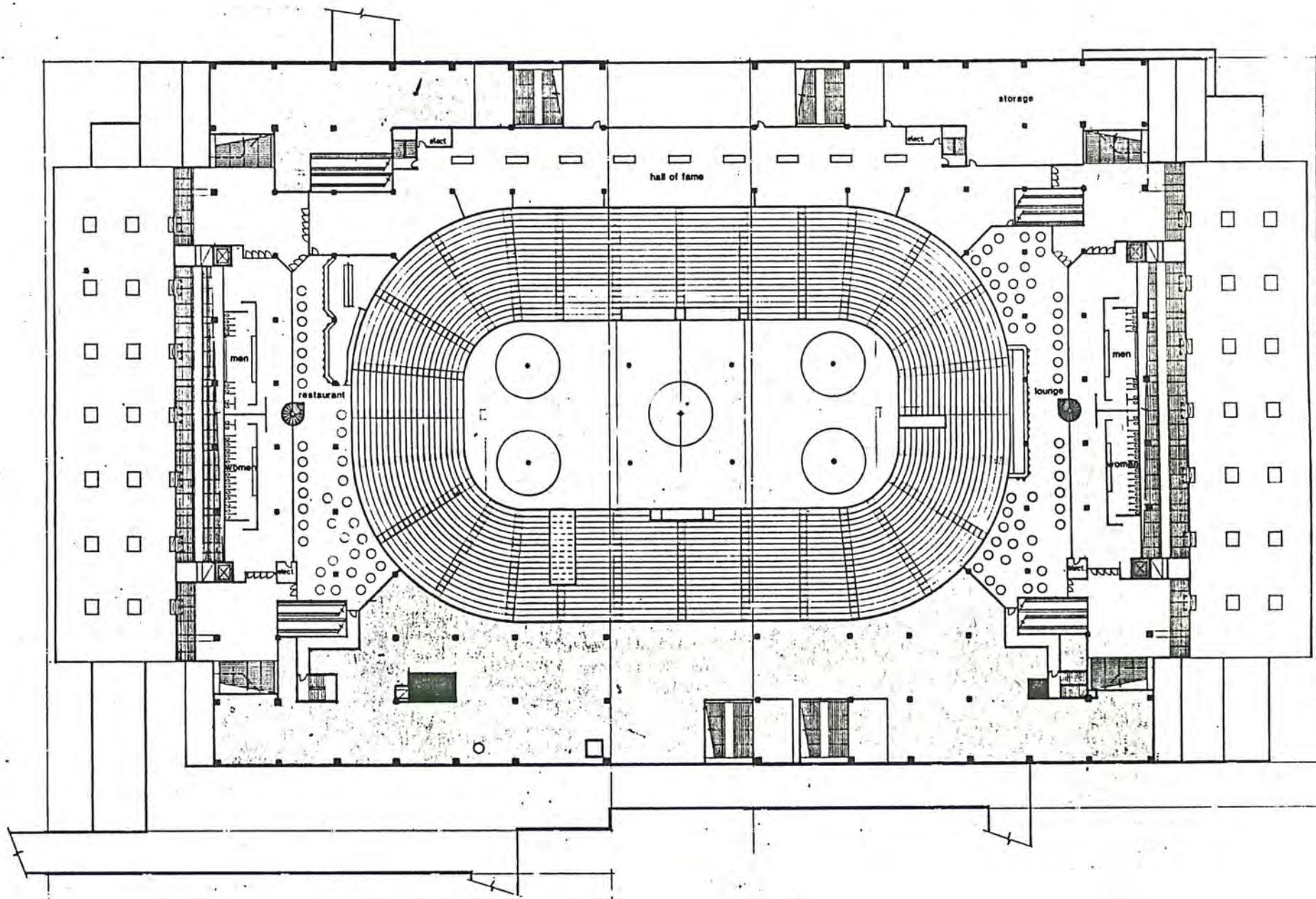


9.100 ICE LEVEL

WINNIPEG ARENA

0 10 20 30 40 M



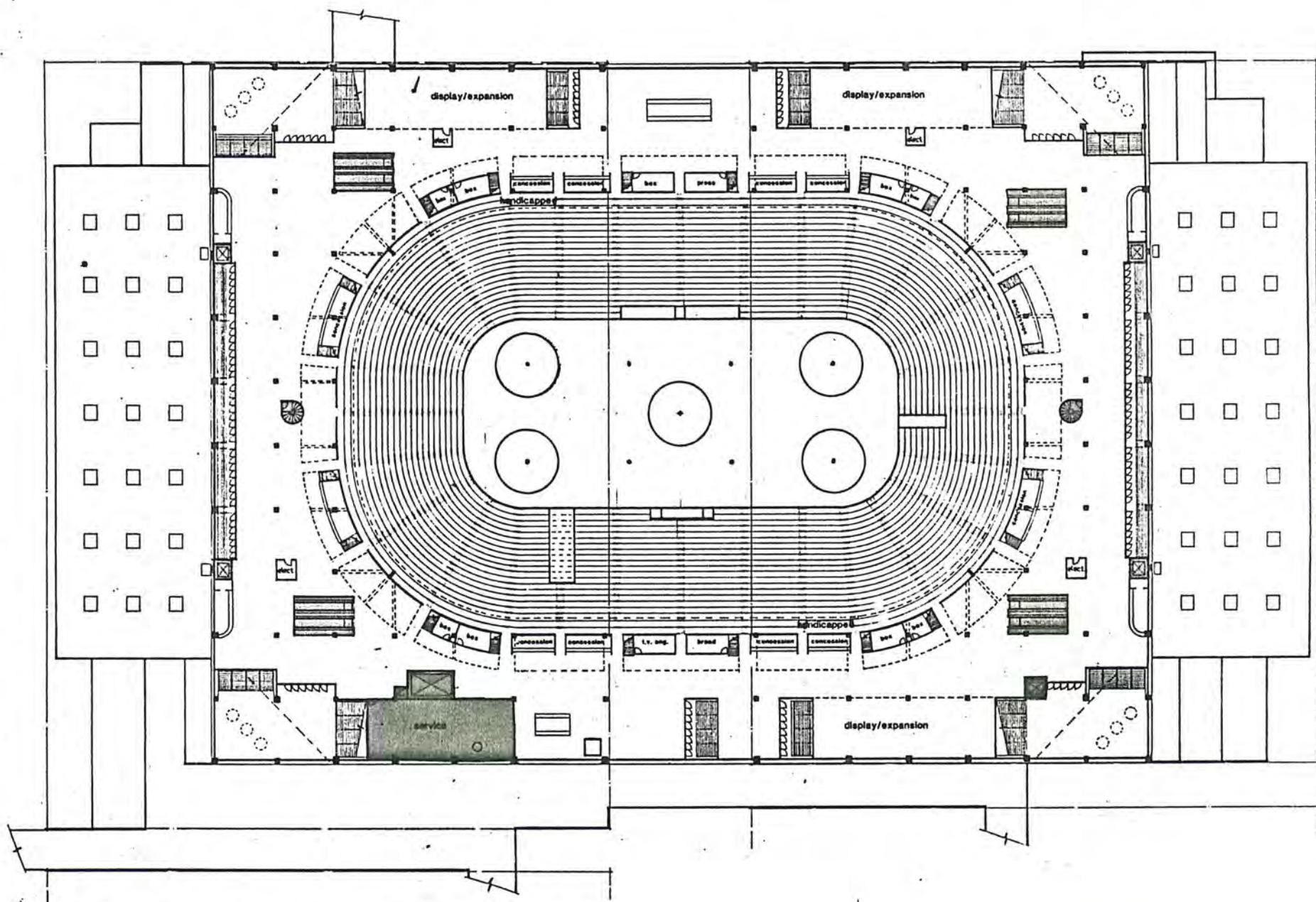


12.700 LOWER CONCOURSE LEVEL

WINNIPEG ARENA

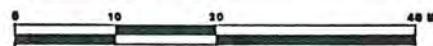


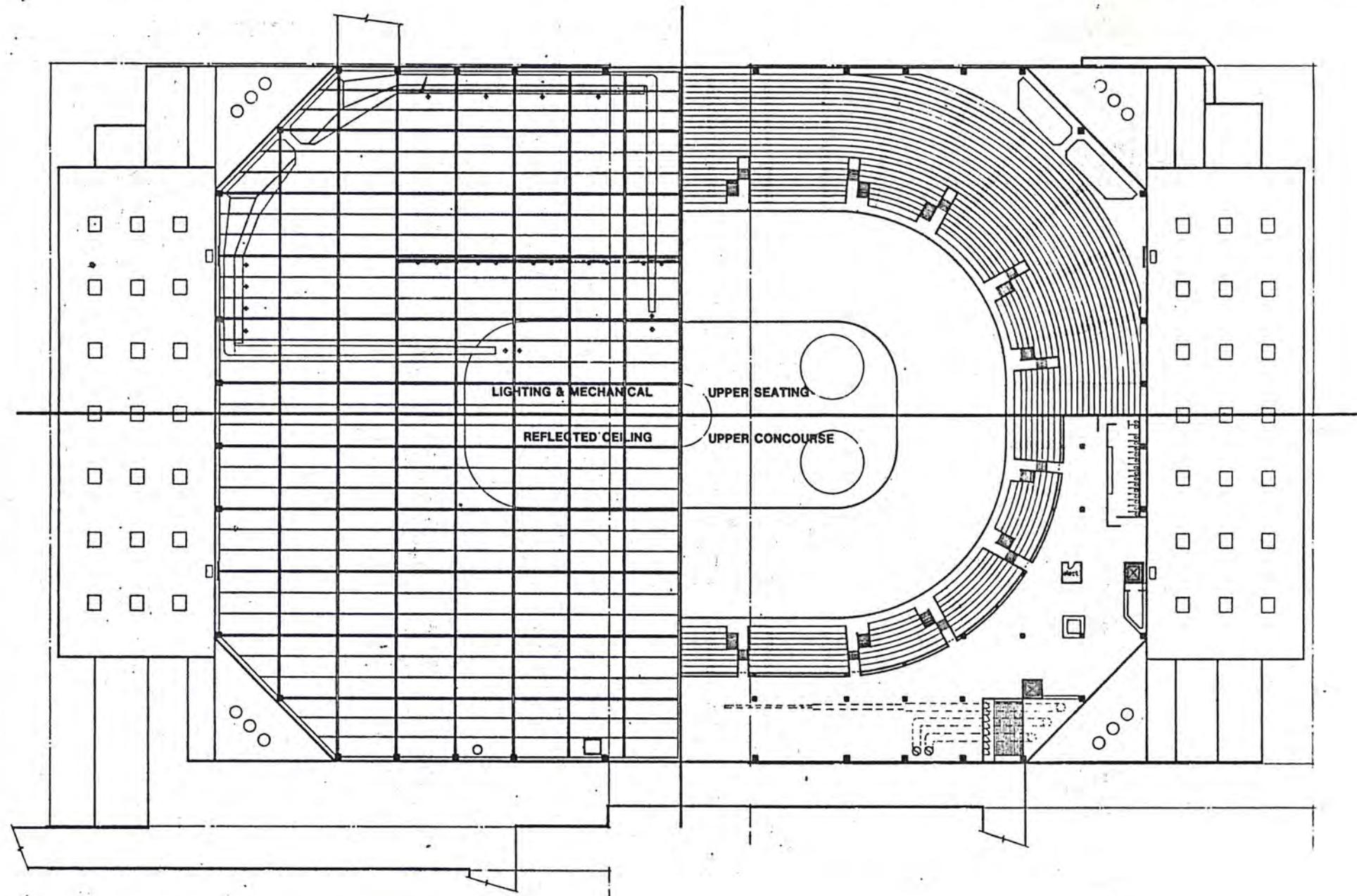
61



16,300 MAIN CONCOURSE LEVEL

WINNIPEG ARENA





19,900 UPPER CONCOURSE LEVEL

WINNIPEG ARENA



MECHANICAL

supply air 

return air 

exhaust 

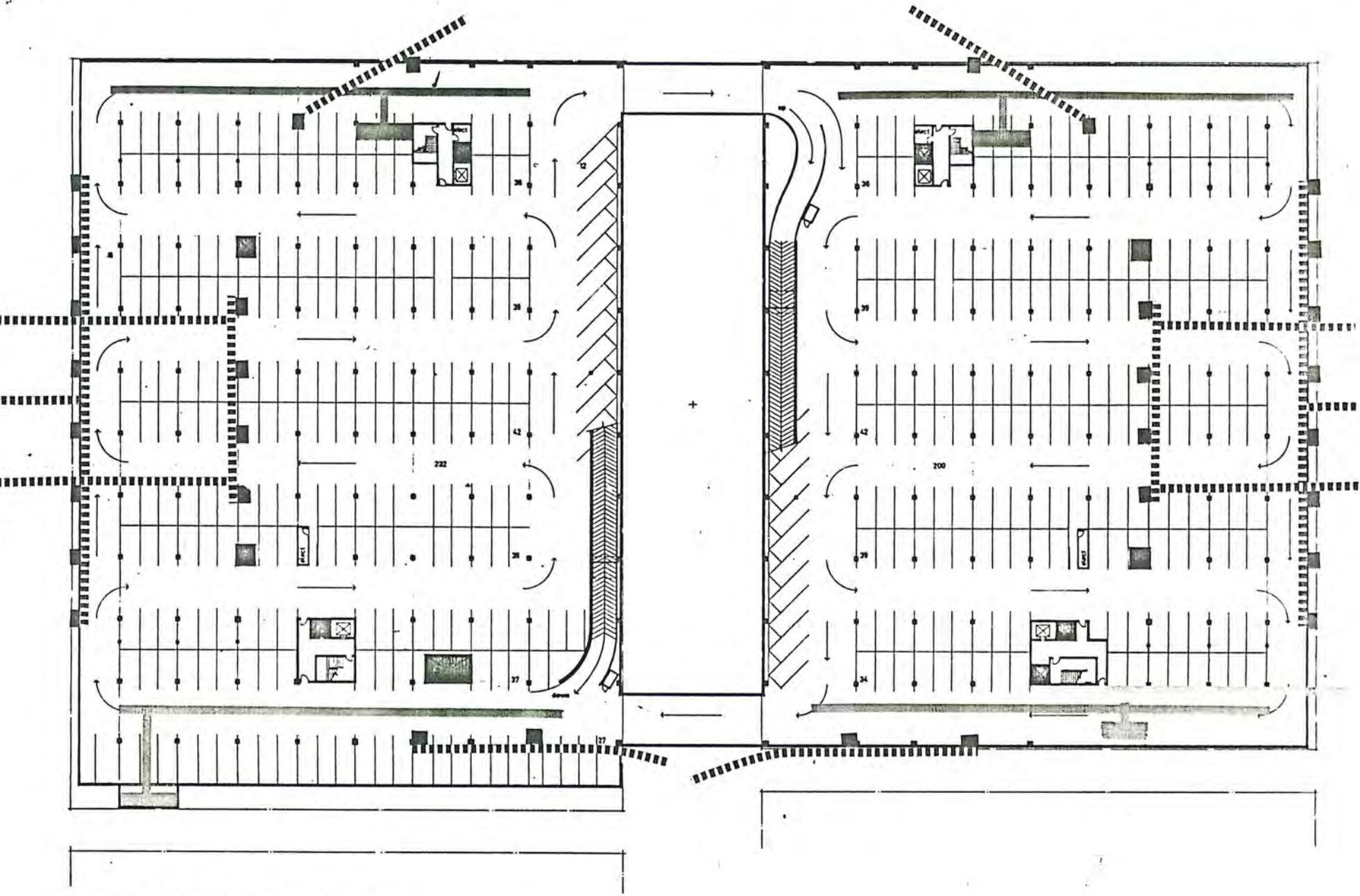
heat pump loop 

fin radiator 

supply water 

drains &
roof drains 

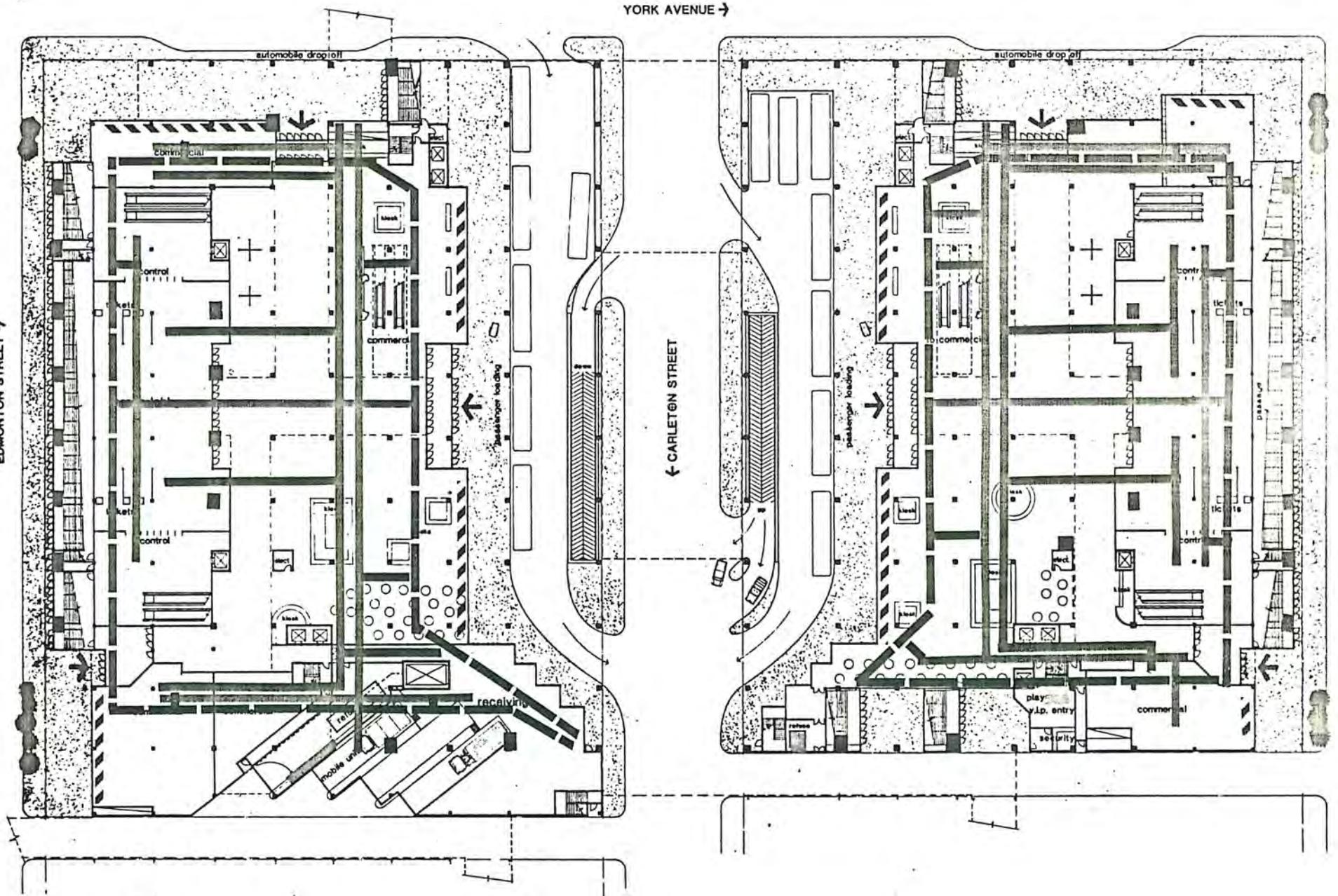
63



-3.048 PARKING LEVEL 432 parking stalls

WINNIPEG ARENA





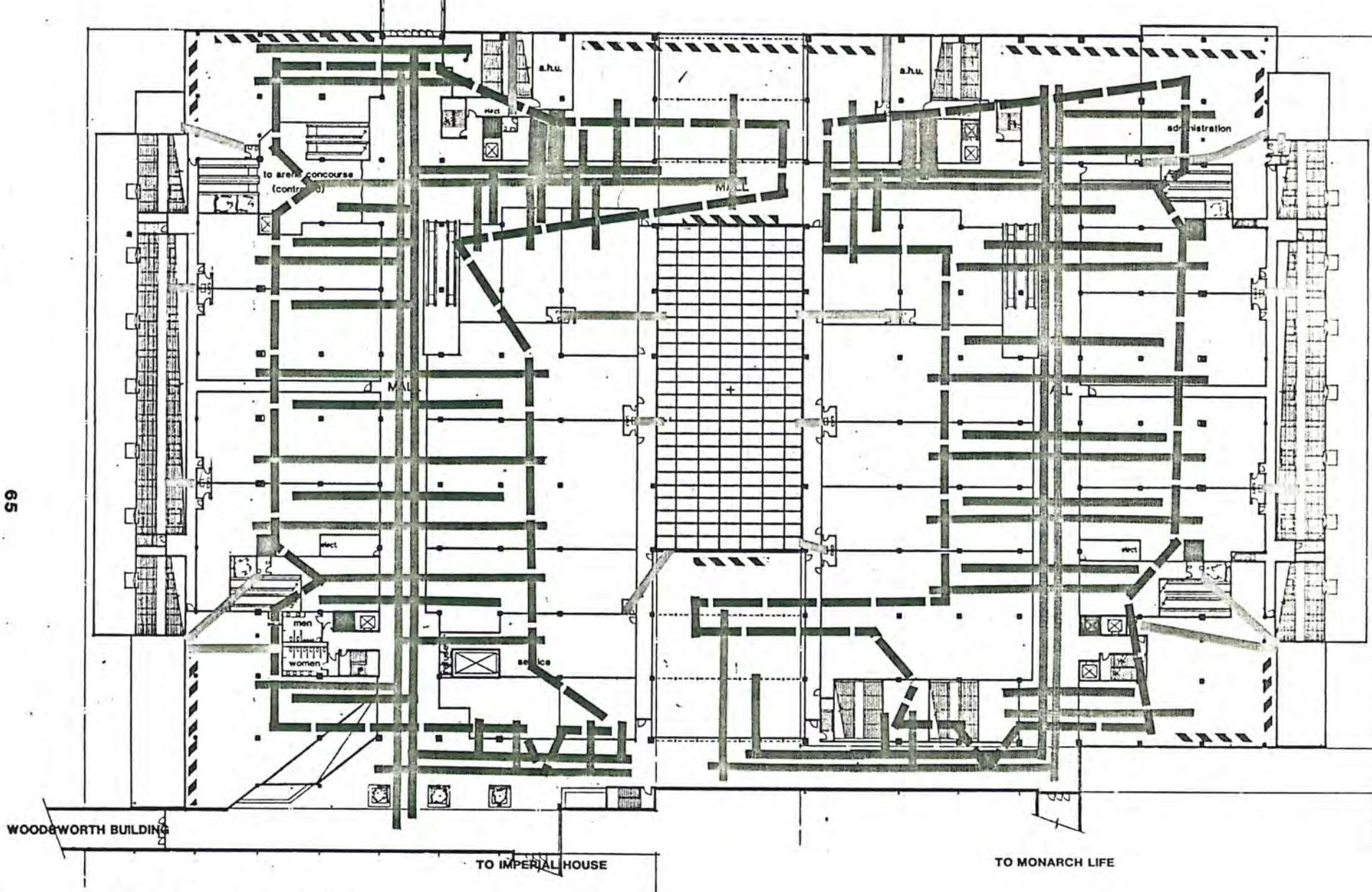
0 ENTRY LEVEL

WINNIPEG ARENA



TO CONVENTION CENTRE

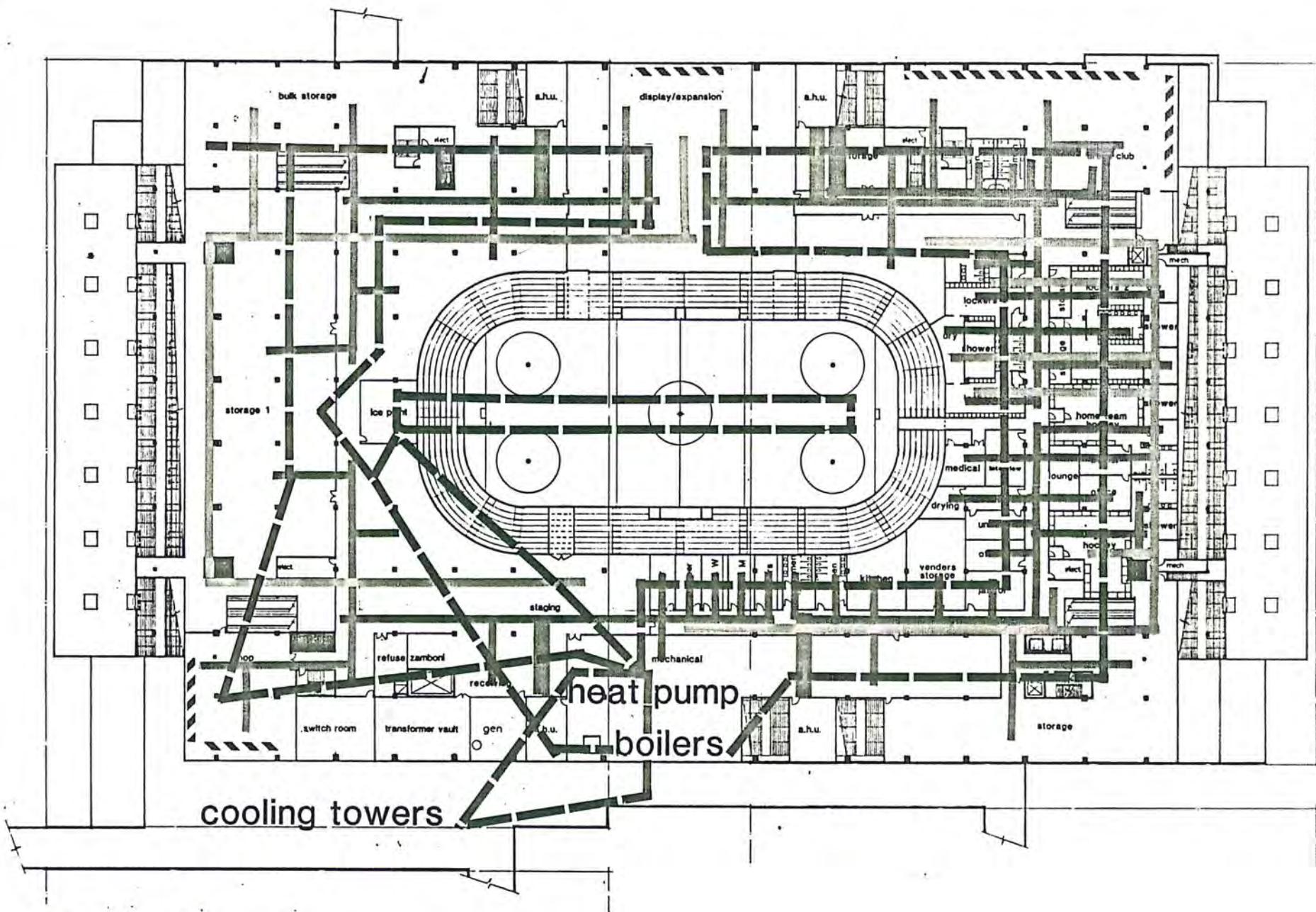
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5,500 COMMERCIAL LEVEL

WINNIPEG ARENA

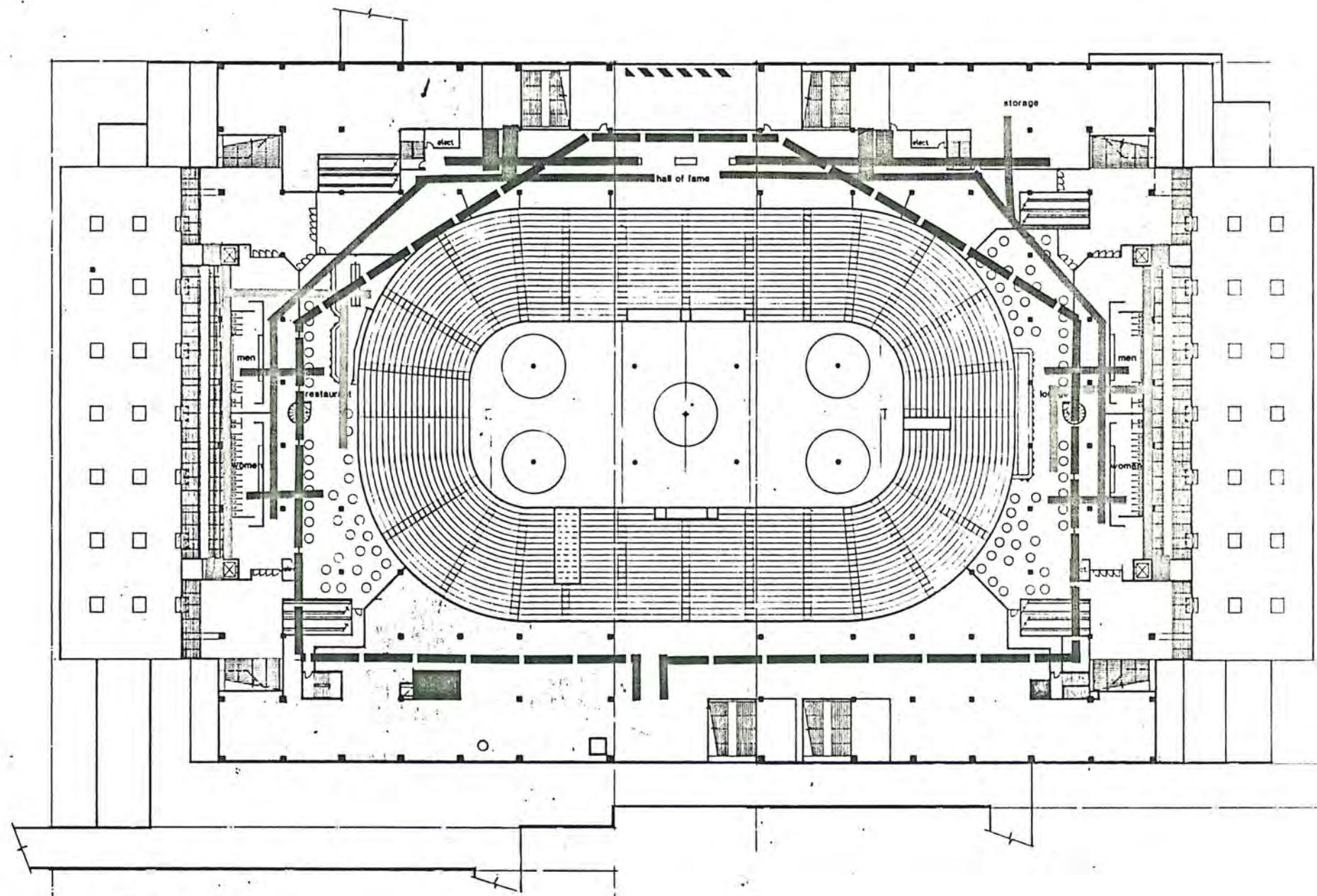




9.100 ICE LEVEL

WINNIPEG ARENA

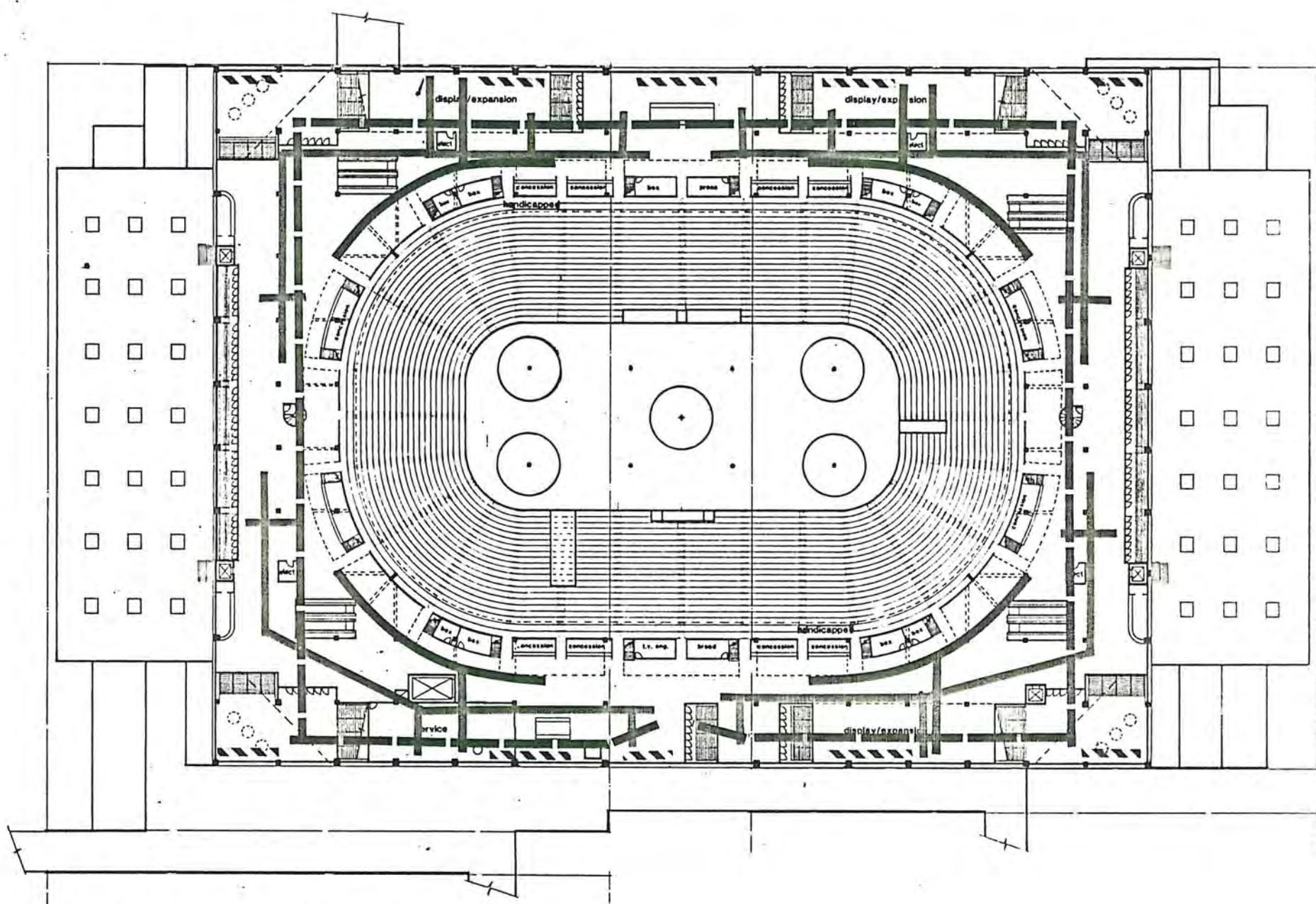




12.700 LOWER CONCOURSE LEVEL

WINNIPEG ARENA

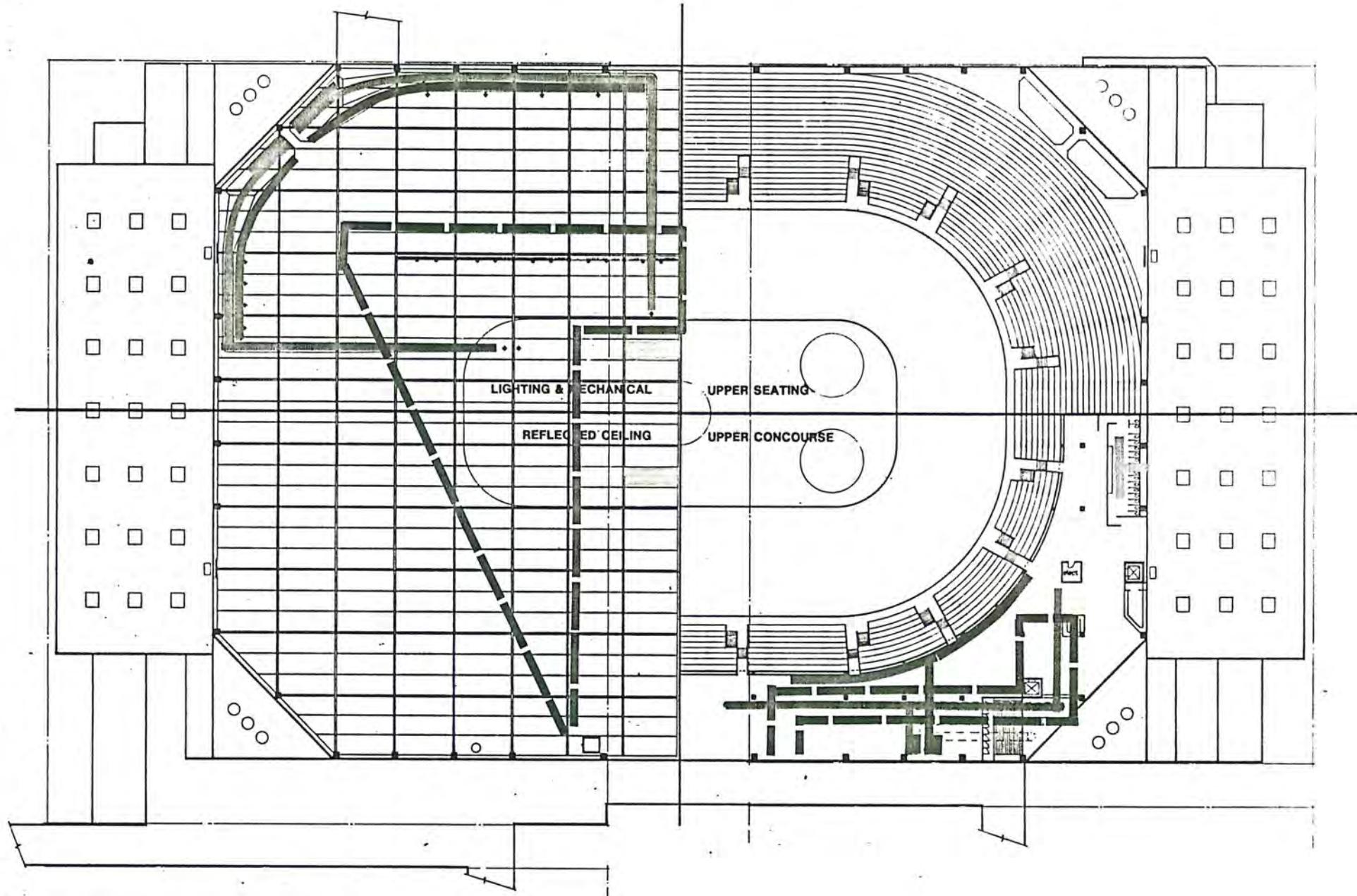




16,300 MAIN CONCOURSE LEVEL

WINNIPEG ARENA



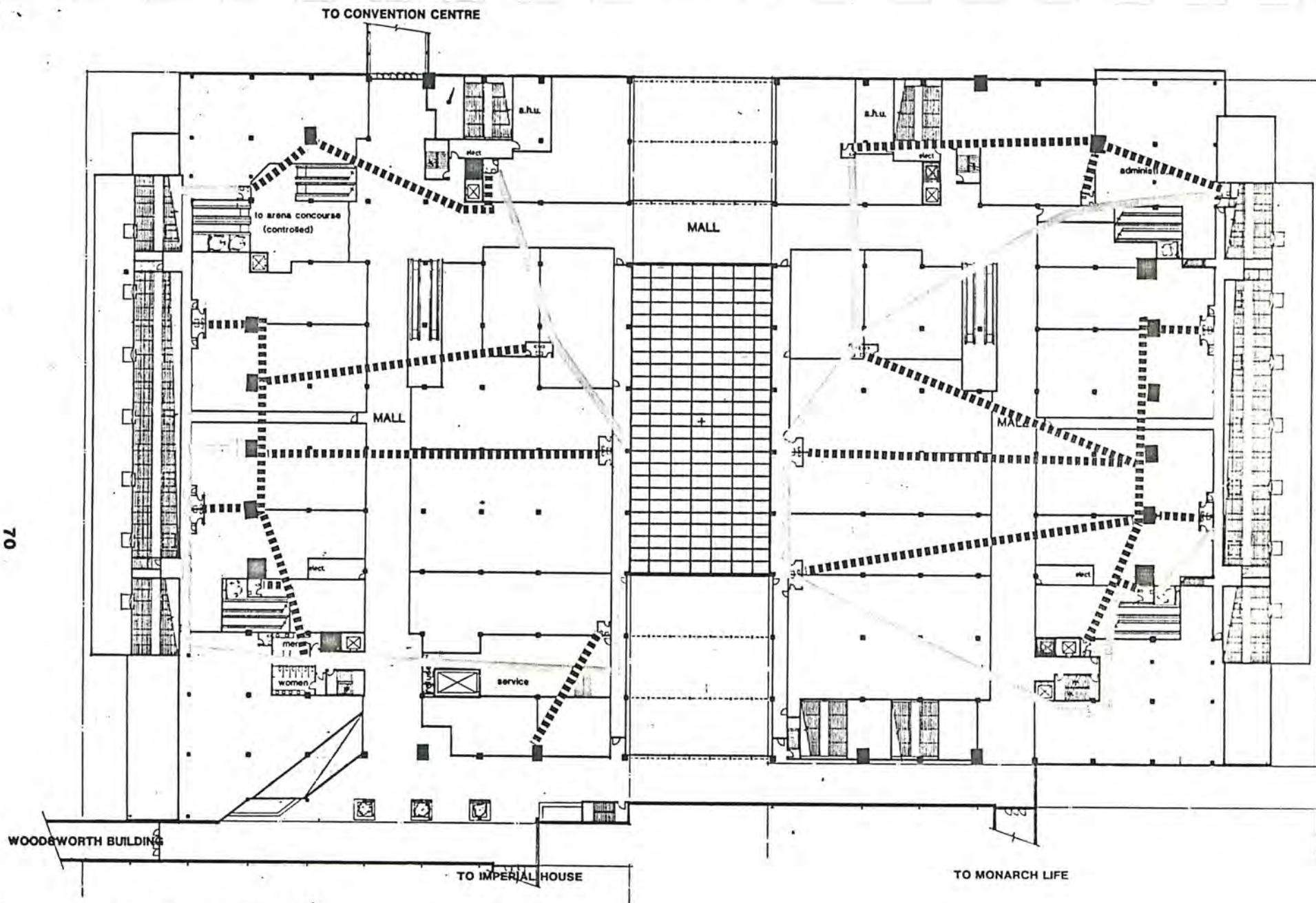


19,900 UPPER CONCOURSE LEVEL

WINNIPEG ARENA



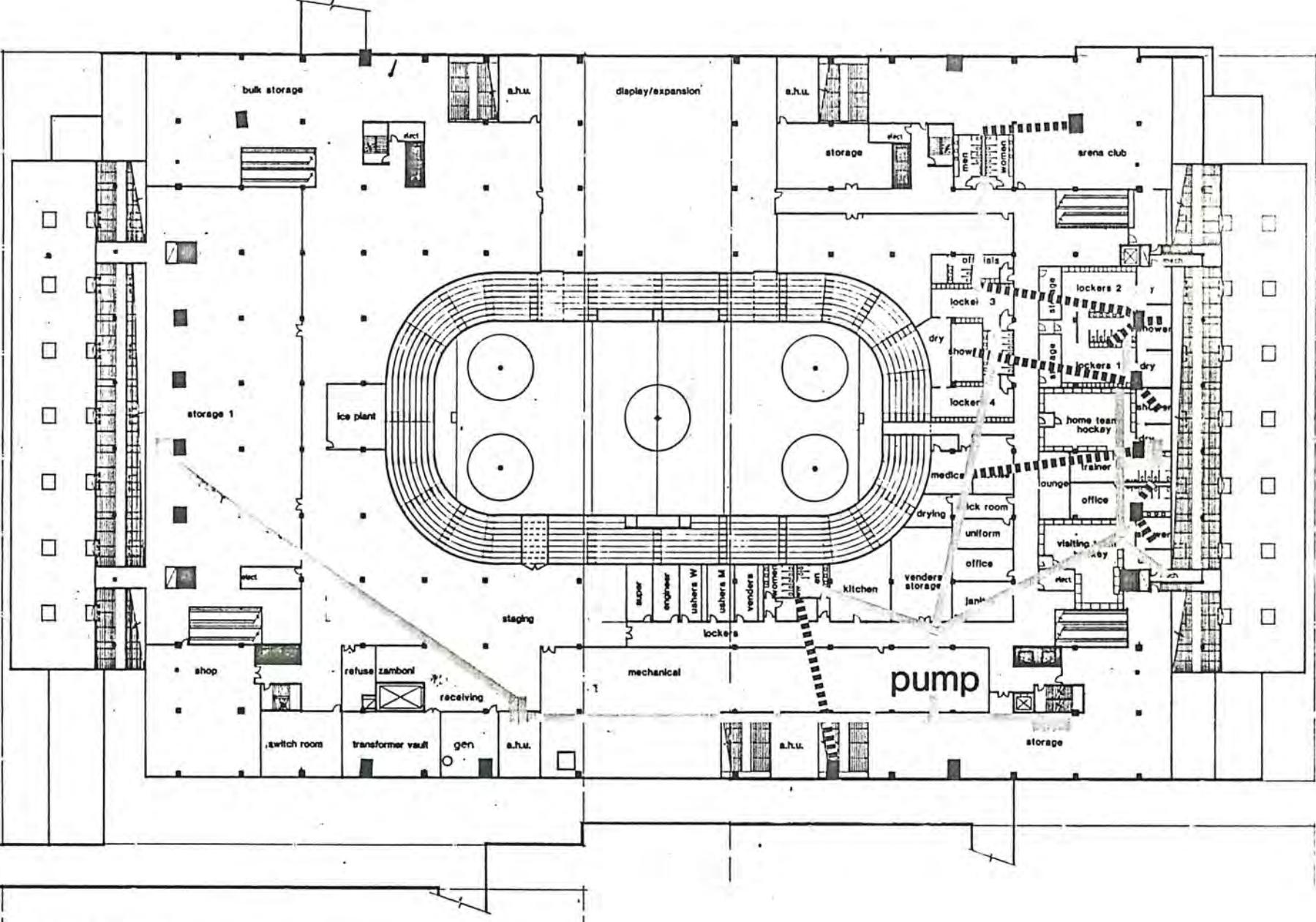
70



5,500 COMMERCIAL LEVEL

WINNIPEG ARENA

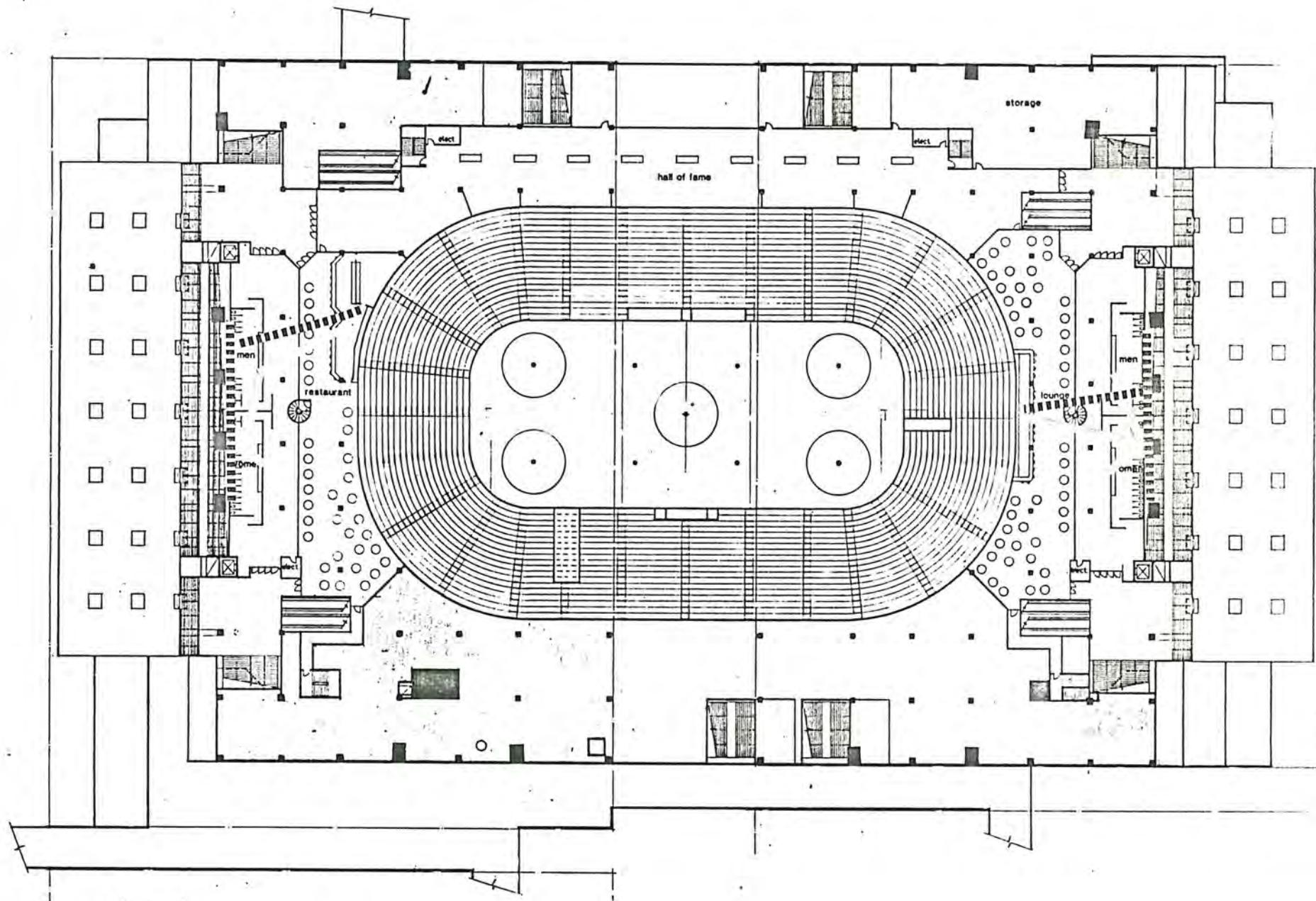




9.100 ICE LEVEL

WINNIPEG ARENA

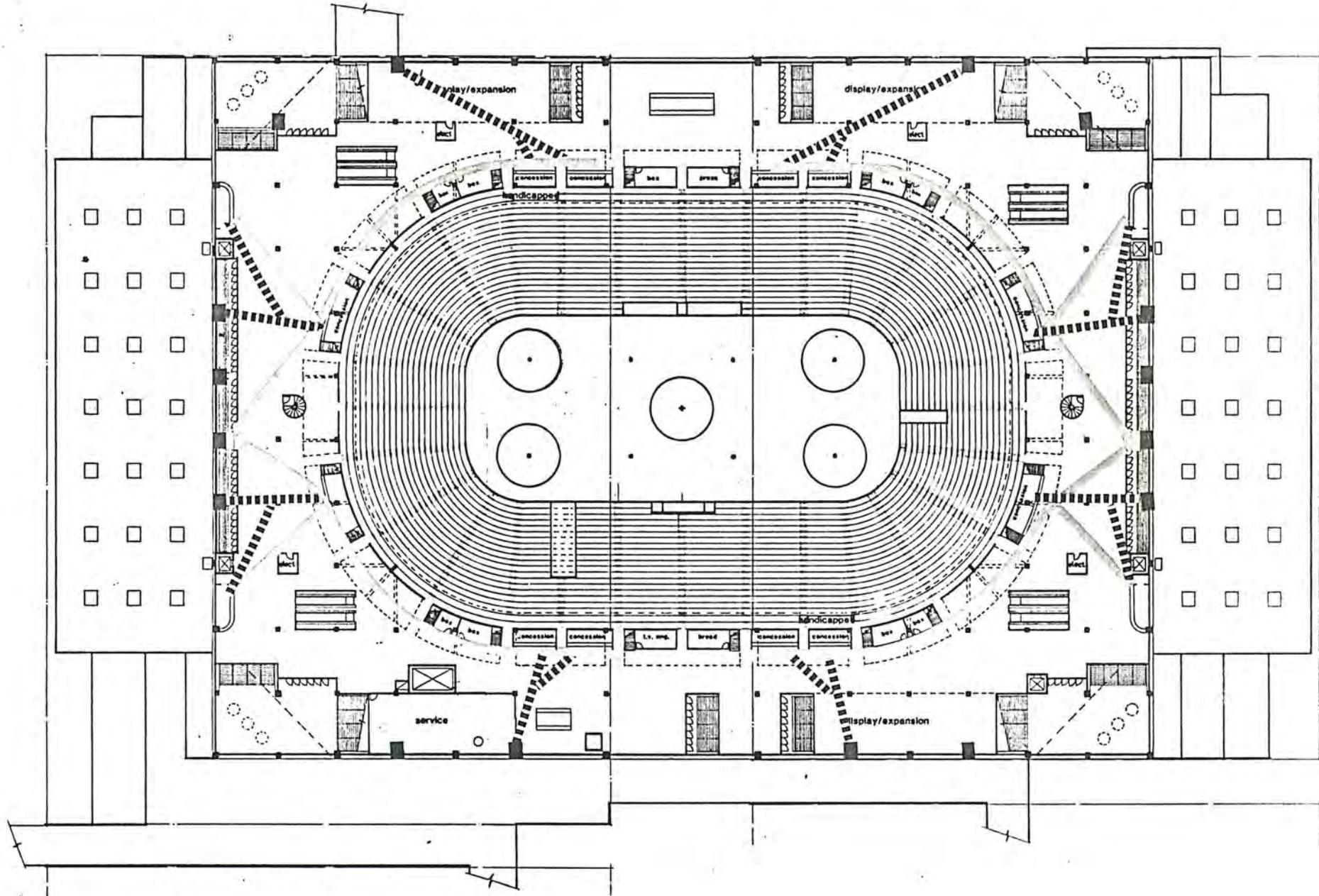




12,700 LOWER CONCOURSE LEVEL

WINNIPEG ARENA

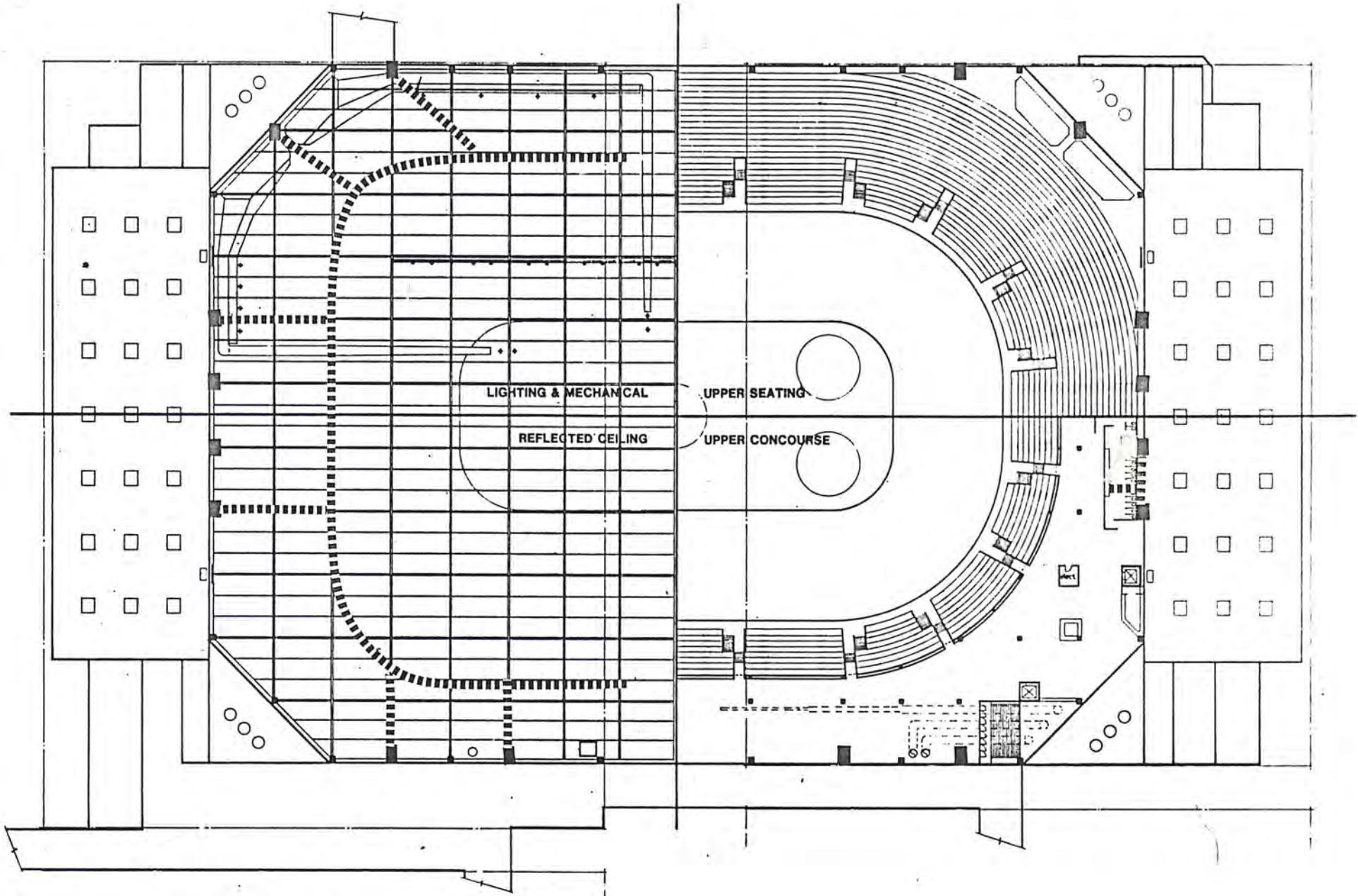




16,300 MAIN CONCOURSE LEVEL

WINNIPEG ARENA





19,900 UPPER CONCOURSE LEVEL

WINNIPEG ARENA



Cost Analysis

Project: WINNIPEG ARENA

Cost Plan/Cost Check No:
Date: December, 1981Sheet
No: One

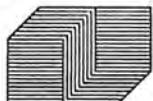
Element	Amount \$	Total Cost \$	Rate \$/M Floor Area	%	Comments
1 Substructure (a) Normal foundations (b) Basement excavations (c) Special conditions		8,840,000.		10.00	
2 Structure (a) Lowest floor construction (b) Upper floor construction (c) Roof construction		22,100,000.		25.00	
3 Exterior Cladding (a) Roof finish (b) Walls below ground floor (c) Walls above ground floor (d) Windows (e) Exterior doors & screens (f) Balconies & projections		4,420,000.		5.00	
4 Interior Partitions (a) Permanent partitions (b) Movable partitions (c) Doors		3,978,000.		4.50	
5 Vertical Movement (a) Stairs (b) Elevators & escalators		3,536,000.		4.00	
6 Interior Finishes (a) Floor finishes (b) Ceiling finishes (c) Wall finishes		4,420,000.		5.00	
7 Fittings & Equipment (a) Fittings & fixtures (b) Equipment		2,210,000.		2.50	Specialty sports equipment and seating.



Project: WINNIPEG ARENA

Cost Plan/Cost Check No:
Date: December, 1981Sheet
No: Two

Element	Amount \$	Total Cost \$	Rate \$/M Floor Area	%	Comments
8 Services (a) Electrical (b) Plumbing & drainage (c) Heating, ventilation & air conditioning		26,520,000.		30.00 10.00 20.00	(a) (b) & (c)
9 Overheads & Profit		5,304,000.		6.00	
Net Building Cost		81,328,000.		92.00	
10 Site Development (a) General (b) M & E site services (c) Alterations (d) Demolition		1,768,000.		2.00	
11 Contingencies		5,304,000.		6.00	
TOTAL		88,400,000.	1,076.00	100.00	Reference: "Robert Snow Means Company Construction Cost Consultants", Toronto: 39th ed., 1981.



Appendix A and Appendix B

- (20) Film exchange.
- ♦ (21) Frozen food locker used exclusively for service directly to the consumer.
- ♦ (22) Funeral parlors.
- ♦ (23) Hospitals for small animals.
- ♦ (24) Ice storage house, not more than ten (10) tons capacity.
- (25) Interior decorating store.
- (26) Medical or dental clinics and laboratories.
- (27) Music conservatory or music instruction.
- (28) Newsstand.
~~(28A) NEEDLE TRADES (BY-LAW 1313)~~
- (29) Pawnshop.
- (30) Plumbing or sheet metal shops, not including the manufacture for wholesale of plumbing or sheet metal products, if conducted wholly within a completely enclosed building.
- (31) Printing, lithographing or publishing.
- (32) Public garage, including automobile repairing, and incidental body and fender work, painting or upholstering, if all operations are conducted within a completely enclosed building. Provided, however, that where a public garage is located on a lot within fifty (50) feet of a lot in an "R" District, the garage wall, nearest to such lot, shall have no openings other than stationary windows unless a lane intervenes, and provided further that the parcel of land on which a public garage is situated is developed as required in subsection (9) of Section 1701.
- (33) Public services, including electric distributing sub-station, fire or police station, telephone exchange, and the like.
- (34) Rescue missions or temporary revival churches.
- ♦ (35) Second-hand store, if conducted wholly within a completely enclosed building.
- (36) Sign painting shop, if conducted wholly within a completely enclosed building.
- (37) Storage building for household goods.
- (38) Studios (except motion picture).
- (39) Tire shop operated wholly within a building.
- (40) Tourist court.
- (41) Trade school, if conducted wholly within a completely enclosed building.
- ♦ (42) ~~Trailer or public camp. REPEALED - BY-LAW 1632, MAY 28/70.~~

CHAPTER 10

"C2" COMMERCIAL DISTRICTS

The following regulations shall apply in the "C2" Commercial Districts:

1001. USE—No building, structure or land shall be used and no building or structure shall be hereafter erected, altered, or enlarged, except for the following uses:
- (1) Any use permitted in the "C1" District.
 - (2) Any retail store, or retail business.
 - (3) Advertising signs or structures and billboards. *NY 5122*
 - ♦ (4) Amusement enterprises, including a billiard or pool hall, bowling alley, boxing arena, dance hall, games of skill and chance, theatre, and the like, if conducted wholly within a completely enclosed building.
 - (5) Art or antique shop, if conducted wholly within a completely enclosed building.
 - (6) Auditorium.
 - ♦ (6a) Automobile service station, provided any tube and tire repairing, battery charging, and storage of merchandise and supplies are conducted wholly within a building; and provided further, that any lubrication or washing, not conducted wholly within a building, shall be permitted only if a masonry wall or suitable fence six (6) feet in height, is erected and maintained between such uses and any adjoining "R" District and provided further that the parcel of land on which an automobile service station is situated is developed as required in subsection (9) of Section 1701. BY-LAW 1632, May 28/70
 - ♦ (8) Automobile and trailer sales area, provided (a) that such area is located and developed as required in Section 1701, and (b) that any incidental repair of automobiles or trailers shall be conducted and confined wholly within a building.
 - ♦ (9) Automatic self-service laundry.
 - ♦ (10) Baseball or other stadium.
 - ♦ (11) Baths, public.
 - ♦ (12) Bird store, pet shop or taxidermist.
 - (13) Business college or private school operated as a commercial enterprise.
 - (14) Blueprinting or photostating.
 - (14a) Car washing.
 - (15) Carpenter shop, or cabinet shop, if conducted wholly within a completely enclosed building, but excluding wholesale manufacture.
 - (16) Cleaning establishment, using non-inflammable and non-explosive cleaning fluid.
 - (17) Department or furniture store.
 - (17a) Restaurant, tea room or cafe (with or without dancing or entertainment). BY-LAW 1632, May 28/70
 - ♦ (18) Flour and feed store.
 - (19) Fuel order office.

(43) Upward facing steps, if conducted wholly within a completely enclosed building.

(44) Signs, where such signs are located on the same lot.

(45) Loading space as required in Section 1701

(45) Limited uses as in businesses such as: photography supplies, sporting goods, children's toys, jewellery, watchmakers' and opticians' supplies, provided that these uses confine their storage facilities to the building containing office, display, and shipping and sales activities. Separate warehouse facilities shall not be permitted in this district. BY-LAW 1341, Aug. 8/68

NOTE—These uses must be approved by the Medical Health Officer of the City of Winnipeg.

1002. HEIGHT.

NOTE—Only the general height restrictions provided by the Building By-law are applicable.
100 Feet, Reference to Legislative Building.

1003. AREA—No building or structure nor the enlargement of any building or structure shall be hereafter erected unless the following yards and lot areas are provided and maintained in connection with such building, structure or enlargement.

FRONT YARD. Where the entire frontage is located in the "C2" District, no front yard shall be required. Where the entire frontage is located partly in the "C2" District and partly in an "R" District, the yard requirement of the "R" District on the frontage shall apply in the "C2" District. In any case, however, where any building is erected or converted wholly or partly for any residential use, there shall be the same front yard requirement as in "R3" districts.

(2) **SIDE YARDS**. Where the side of a lot in the "C2" District abuts upon the side of a lot in an "R" District there shall be a side yard of not less than ten (10) per cent of the width of the lot, but such side yard need not exceed five (5) feet and shall not be less than three (3) feet in width.

Where the rear of a reversed corner lot abuts upon the side of a lot in an "R" District, the side yard on the street side of the reversed corner lot shall be not less than fifty (50) per cent of the front yard required on the lots in the rear of such corner lot (excluding key lots), but such side yard need not exceed ten (10) feet in width. No accessory building on said reversed corner lot shall project beyond the front yard line required on the key lot in the rear, nor shall be located nearer than five (5) feet to the side lot line of such key lot.

Provided, however, that this section shall not be so interpreted as to reduce the buildable width of a reversed corner lot of record at the time this By-law became effective to less than twenty-eight (28) feet for a main building, nor less than twenty (20) feet for an accessory building. In all other cases, a side yard for a commercial building shall not be required, but if provided it shall not be less than three (3) feet in width unless the side of the lot is adjacent to a street or lane.

Buildings hereafter erected or converted wholly or partly for residential purposes in a "C2" District shall comply with the side yard regulations of "R3" Districts.

(3) **REAR YARD**. There shall be a rear yard of not less than twenty-five (25) per cent of the depth of the lot, but such rear yard need not exceed twenty-five (25) feet for interior lots nor fifteen (15) feet for corner lots. Provided, that where the rear of a lot in the "C2" District abuts upon the side or rear of a lot in a "C", "CM", or "M" District, the rear yard need not exceed ten (10) feet in depth.

Buildings hereafter erected or converted wholly or partly for residential purposes in a "C2" District shall comply with the rear yard regulations of "R3" Districts.

(4) **LOT AREA**. Buildings hereafter erected or converted wholly or partly for residential purposes in a "C2" District shall comply with the lot area requirements of "R3" Districts.

(5) **COURTS**—Buildings hereafter erected or converted wholly or partly for residential purpose shall comply with the requirements for Courts in the "R3" District. **34**

SPORTING FACILITIES

1. Playing Floor Surface 17,000

(professional hockey 85' x 200')

2. Penalty Boxes (2) 80

(including time keeper)

3. Team Benches (2)

Locker room sizes determined for volleyball tournament competition. This is a maximum locker room requirement.

4. Two Visitor's Locker Room (2) 2,028

Lockers and dressing (24) 576

WC (6) 198

Showers (6) 144

Drying 96

5.	Two Home Team Locker Rooms (2)	2,028
	Lockers and Dressing (24)	576
	W.C. (6)	198
	Showers (6)	144
	Drying	96
6.	Home Team Hockey	2,366
	Lockers and Dressing (24)	768
	(lockers 2' x 4')	
	W.C. (6)	198
	Showers (6)	144
	Drying	96
	Office	400
	Trainer	300
	Stick Room	230
	Drying Room	230

7. Visiting Hockey Team 1,206

Lockers and Dressing (24) 768

W.C. (6) 198

Showers (6) 144

Drying 96

8. Player's Lounge 400

Lounge should be in close proximity to Home Team Hockey's dressing room and Visitor's. Room can work in conjunction with interview room.

9. Medical Room 250

Adjacent to Home Team Hockey's dressing room but available to visiting teams and public.

10. Official's Locker Room 318

Lockers and Dressing (8) 192

W.C. (2) 66

Showers (2) 60

11. Uniform Storage, Equipment Storage and Skate Sharpening	180
Total	25,856

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