



MORRISON HERSHFIELD

APPLICATION OF THE ONTARIO BUILDING CODE

150 Elgin - Office Tower and Grant House Renovations

150 Elgin Street
Ottawa, Ontario

Presented to:

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APPENDIX Table 1: 150 Elgin – Occupant Load and Office Washroom Requirements

1. INTRODUCTION

1.1 Background

Morrison Hershfield Limited (MH) has been retained by Morguard Investments Limited to investigate the application of the Ontario Building Code (OBC) to the new office tower to be located at 150 Elgin Street in Ottawa.

This report is provided to the project team for use during design and for submission to the City of Ottawa in conjunction with the building permit application.

1.2 Scope of Work

This report is a presentation of Ontario Building Code requirements applicable to this new office building and associated parking structure, including the relationship with the existing heritage building Grant House. The scope of this report is limited to the major fire, life safety and occupancy elements as applicable to the proposed building. The basis for these requirements is Part 3 of the 2006 Ontario Building Code (OBC). Unless otherwise stated, Division B of the OBC is referenced in this report.

1.3 Methodology

The application of the Code has been based on our understanding of the proposed building project as represented in drawings by DCYSA Architecture & Design and discussions with the design team.

1.4 Limitations

Reviewed material, furnished by others, is expected to be free of latent deficiencies or inaccuracies. Only design calculations with respect to occupant load, exit capacity, and washroom requirements were performed and included in this report.

Comments and conclusions within this report represent our opinion, which has been based on an examination of the documents provided, our Code analysis and our past experience. This review is limited to technical performance and fire safety related requirements of the building and Codes.

In issuing this report, Morrison Hershfield does not assume any of the duties or liabilities of the designers, builders, owner or operators of the subject property. Persons who use or rely on the contents of this report do so with the understanding as to the limitations of the documents examined. Such persons understand that Morrison Hershfield cannot be held liable for damages they may suffer in respect to the design, construction, purchase, ownership, use or operation of the subject property.

2. BUILDING DESCRIPTION

The building at 150 Elgin is a 21 storey office tower with 3 floors of underground parking and 2 mechanical floors at the penthouse level. The ground floor of the tower will include commercial suites opening to Gloucester Street, and the “Winter Garden” which is an interior public space with seating and art displays. Exterior terraces are located on several office floors, and the 7th floor will have a terrace accessible to the public.

The existing heritage building “Grant House” is located at the southeast corner of the property, and will be an integral part of the new building since the tower’s east curtain wall will embrace the rear 2 storey portion of Grant House. The rear wall of Grant House will be showcased within the Winter Garden. A door will provide passage between the ground floor of the tower and Grant House.

3. APPLICABLE CODES

The construction is required to comply with the 2006 Ontario Building Code (OBC) as amended to date. A building permit is required to be obtained in accordance with local by-laws and the Building Code Act (O. Reg. 350/06 as amended to date).

The construction of the tower is subject to Division B, Part 3 of the OBC by virtue of its size and occupancy. Part 11 is applicable to the modifications to Grant House since it is an existing building greater than 5 years old.

The Ontario Fire Code (OFC) is applicable to the use and maintenance of this building upon occupancy. A Fire Safety Plan is required by the OFC to be provided to document the administrative approach and procedures for response to emergencies.

The National Building Code is not applicable to construction at this time but should be considered if a federal tenant is a future possibility.

4. APPLICATION OF THE OBC TO THE PROJECT

4.1 Building Concept

The tower is considered to be an addition to the existing 3 storey Grant House since the two buildings cannot be practically separated by firewall construction, walkways or zero lot line construction.

The application of Part 11 to Grant House is discussed in Section 5 of this report, and the application of Part 3 to the tower is addressed in Section 6 of this report.

Section 4.3. of this report discusses the addition of a high-rise office tower to a 3 storey heritage building of combustible construction.

4.2 Building Size, Use and Occupancy

4.2.1 Building Size

The building area (footprint) of the project is approximately 3340 m². This includes the Grant House footprint of approximately 280 m².

The tower is 21 storeys in building height, and has two mechanical penthouse levels and three underground parking levels. The two penthouse levels are not considered as storeys in calculating building height since they are provided for elevator machinery and service rooms used for no purpose other than service to the building as per Sentence 3.2.1.1.(1).

Grant House is 3 storeys in building height. It has a basement level that will not be connected to the basement levels under the tower, except for the passage of service lines.

4.2.2 Use and Occupancy

The building will contain four major occupancies:

- Group D (business and personal services) for the offices;
- Group E (mercantile) for the ground floor commercial spaces ;
- Group F, Division 3 (low hazard industrial) for the parking garage which will include parking spaces for the public; and
- Group A, Division 2 (assembly) for the 7th Floor public terrace and Winter Garden space, and for a future restaurant use in the Grant House.

The building will contain subsidiary Group A, Division 2 occupancies for meeting rooms in the office spaces, and subsidiary Group F, Division 3 spaces for storage.

4.2.3 Building Features

The building will have the following significant features:

- High building features will be provided such as separated above and below grade exit stairwells, central alarm and control facility, smoke venting etc. See Section 5 for the extent to which high building features are provided in Grant House.
- The ground floor Winter Garden will be a public circulation space containing art display space and seating areas, and providing access to Grant House.
- The Winter Garden is a two storey interconnected floor space connecting only the ground and 2nd floors, but extending the height of 3 storeys. The interconnected floor space includes the 2nd floor office floor area and the ground floor public corridor through to the main lobby.
- Window sprinkler systems will be provided to protect glazing where the 3rd Floor overlooks Winter Garden, and at the north exterior wall to reduce the amount of unprotected openings.
- Rooftop terraces are provided for office occupants on the 2nd, 3rd, 4th, and 18th floors.
- A rooftop terrace is provided for public use on the east side of the 7th Floor.
- The tower will include intensive and extensive green roof features.

4.3 High-Rise Office Tower Connected to Grant House

Construction is permitted to be an addition to an existing building without constraints or conditions, except that Part 11 applies to the existing building and other Parts apply to the addition. The OBC does not prohibit a high-rise addition to an existing low-rise building. The combustible construction of Grant House is existing and is permitted to remain on the basis that the OBC permits a renovation or extension to retain the existing character, structural uniqueness, heritage value or aesthetic appearance if the construction will not adversely affect the early warning and evacuation systems, fire separations, the structural adequacy or create an unhealthy environment in the building (Article 11.3.3.1.)

This section describes the measures that will be taken so that the high-rise tower is not adversely affected by the connection to Grant House and vice versa.

1. Sprinkler Protection for All Floor Areas

The high-rise tower is required to be sprinklered. Sprinkler protection of Grant House is required due to the change of use to assembly occupancy on the 3rd floor of Grant House. While sprinkler protection is a basic OBC requirement for this project, it is noted that the sprinkler protection throughout will reduce the risk of a fire spreading beyond the area of origin, and it will reduce the amount of smoke generated in a fire.

2. Fire Separation of the Tower and Grant House

The tower's interconnected floor space meets conditions for exemption of special protection under Sentence 3.2.8.2.(6) since it consists only of the first and second storeys, it is sprinklered, and it contains only office and assembly occupancies. Grant House connects to the tower at the first and second storeys only since the 3rd Floor has a smaller footprint that is set back from the tower's east wall. Since Grant House also meets the conditions for exemption of special protection, the first and second storeys of Grant House are considered to be part of the tower interconnected floor space.

However, in order to address the separation of the low-rise Grant House from the high-rise tower, a rated fire separation is proposed between Grant House and the Winter Garden. The fire separation will be maintained since the windows on the rear wall of Grant House will be fixed shut, and the door will be equipped with a self-closing device. The fire separation will reduce the risk of smoke movement between tower and Grant House floor areas.

This fire separation is to have a fire resistance rating of 1 hour based on exposure from the Grant House. This rating is based on the ground floor exterior wall being constructed of loadbearing solid brick (at least 2 wythes thick) with an interior finish of plaster within Grant House. The second floor wood mansard roof will be protected from the interior of Grant House by two new layers of 16 mm Type X gypsum board.

Two windows on the second floor are already protected by wired glass and wired glass is proposed to protect the other windows. The ground floor door will have a 45 minute fire protection rating.

The existing painted brick finish on the Ground Floor and cedar wood shingles on the mansard style roof of the 2nd Floor are proposed to be retained within the Winter Garden.

The rated fire separation protects the combustible framing of Grant House and will reduce the risk that the structure will be involved in a fire that originates in Grant House. The rated fire separation will also reduce the risk that a fire originating in Grant House will spread to the tower.

3. Pressurized Vestibule at the Opening Between the Tower and Grant House

A pressurized vestibule will be constructed on the east side of the door between the tower and Grant House. This is based on the principles of Measure N of

Supplementary Standard SB-4 that are intended to prevent the movement of smoke between a low-rise building and high-rise building joined together. The pressurized vestibule will act to prevent the movement of smoke at the opening between Grant House and the Winter Garden. It will be constructed as an unrated fire separation, and hold-open devices that release on fire alarm and local smoke detection (Sentences 3.1.8.12.(3) and (4)).

4. Fire Separation of the Winter Garden Exit Lobby

The Winter Garden ground and second floor interconnected floor space contains a small exit lobby for Stair 3 (Stair 3 serves B3 through 7th floors). This exit lobby is at the north side of the building approximately 20 metres from Grant House, and it will meet the conditions of Article 3.4.4.2. for a lobby used as an exit. As required by Subclause 3.4.4.2.(2)(e)(iii), the lobby will have an unrated fire separation to adjacent occupancies in the Winter Garden. The path of travel from the exit stair to the exterior door is approximately 5 metres in length.

5. Winter Garden Fuel Load and Smoke Movement

The OBC does not limit the combustibile load of furnishings and building contents within an interconnected floor space. As such, the extent to which the combustibile construction of Grant House represents a fuel load in the interconnected floor space is not addressed by the OBC. The wood framing and the cedar shingles of the mansard roof will be protected on the Grant House side by a gypsum membrane. The cedar shingles are proposed to be retained as a combustibile interior wall finish within the Winter Garden, with an estimated flame spread rating of approximately 150.

The interconnected floor space is a 3 storey high space since the ceiling of the Winter Garden is located at the underside of the 4th floor slab. If a fire originates in Grant House, and if smoke migrates into the Winter Garden despite the measures described above, the smoke will first accumulate in the high volume ceiling space. This will allow additional safe egress time for occupants of the interconnected floor space, especially on the 2nd Floor of the tower.

5. GRANT HOUSE

5.1 Summary

Grant House was built in the 1880s to be a single family dwelling. Since 1973 it was a restaurant and the 3rd floor was used as an apartment for the restaurant owner. A restaurant use is planned to continue in Grant House. The building is a heritage building with significant exterior and interior elements.

This section of the report presents the application of the OBC to Grant House, and the proposed approach to life safety that has been developed to meet the performance level required by the Code and also to preserve key heritage elements of Grant House.

This report comments on the renovations of Grant House that will be undertaken in conjunction with the construction of the tower. This includes modifications to the exiting and the building structure. Details of the restaurant fit-up are not known at this time and will require review once the fit-up design is complete.

5.2 Summary of the Changes to Exiting

The construction of the tower necessitates the removal of the rear fire escape. To replace this exit a new enclosed interior exit stair will be constructed within Grant House to serve all floors. The exit stair is to discharge directly to the outside at grade through the north wall into the Pocket Park. The new exit stair will comply with Part 3 requirements including:

- Minimum 900 mm width.
- Steps with a run between 255 mm and 355 mm, and a rise between 125 mm and 200 mm.
- A 1 hour rated fire separation to the remainder of the building.
- Handrails to comply with Article 3.4.6.4.
- Guards to comply with Article 3.4.6.5.
- Landing dimensions equal to the width of the stairway.
- Not less than 300 mm between a stair riser and the leading edge of a door during its swing.
- Swinging doors will not reduce the required width of exit stairs or landings to less than 750 mm.
- Fire separation construction within the 2nd, 3rd, and basement floor areas to provide a distance between exits of one half the maximum diagonal

dimension of the floor area (2nd and 3rd Floors), or a division of the floor area into fire compartments (basement)

The central interior heritage stair is proposed to be retained as an egress stair for the 2nd, 3rd and Basement levels. Since this is a significant heritage feature of the building, it is proposed to remain unenclosed. Additional smoke detection is proposed on ceilings on each level near the central heritage stair. See Section 5.10 of this report for further discussion of the central heritage stair and overall exiting strategy.

5.3 Building Size, Use and Occupancy

Grant House is of combustible construction and has a footprint (building area) of approximately 280 m² and is 3 storeys in building height. The useable floor areas are:

- Basement 225 m²
- First floor 237 m²
- Second floor 234 m²
- Third floor 140 m²

The previous recognized uses of the building included two major occupancies – Group A, Division 2 (assembly) on the Ground and 2nd Floors, and Group C (residential) on the 3rd Floor. The basement storage and office use were subsidiary occupancies to the restaurant use.

The proposed use of the building is a restaurant on the Ground, 2nd and 3rd Floors with subsidiary storage and office use in the basement.

5.4 Extent of Renovations

The extent of proposed renovations impacts the extent to which building elements must be upgraded. Since the building is a heritage building, the renovations are expected to be limited to those typically undertaken when there is a change in tenant, and can be classified as “basic renovations” under Part 11. This is commonly called a “fit-up”, and typically entails new partition layouts, new finishes, re-use of existing ductwork, plumbing, lighting and electrical distribution systems. The construction requirements applicable to a new building of similar size do not apply unless referenced directly by Part 11.

Any new structural and fire resistance elements, new mechanical and electrical systems, or any other new building systems will be required to meet the same requirements as applicable to new construction.

The analysis in this report is based on the following understanding of the planned scope of work:

- The interior layouts will be modified for new restaurant seating and service areas on the Ground and 2nd Floors.

- The 3rd Floor will be modified to change the use from dwelling unit to restaurant service and seating.
- The basement level will be upgraded but will still function as storage and office use to serve the restaurant.

Based on our understanding of the proposed renovations, the renovations can be classified as “basic renovations”.

5.5 Application of Part 11

Part 11 applies to renovations and changes of use in a building greater than 5 years old. The basis of Part 11 is that the performance level of the building after construction shall not be less than the performance level prior to construction. Performance level must be assessed in the following areas: structural sufficiency, increase in occupant load, change of major occupancy, plumbing and sewage. The review of plumbing and sewage systems are outside the scope of this review. New plumbing systems will be required to conform to Part 7 of the OBC.

5.6 Structural

The performance level of the existing building is reduced since the major occupancy of part of the building will change to a different major occupancy, and the occupant load of the building is expected to increase by more than 15% (refer to the increase of occupant load section below).

A structural engineer will be required to verify that the existing structure is adequate to support the proposed dead and live loads to confirm that the structure is capable of supporting proposed loads.

A structural engineer will also be required to verify that the existing structure is adequate to support the new snow loads that may result from the construction of the new tower, and that it is not adversely affected by the tower with respect to seismic loading.

5.7 Increase in Occupant Load

A maximum occupant load of 60 persons is proposed for the restaurant use on the 3rd Floor. This represents an increase in occupant load of more than 15% relative to the previous apartment use. As such, the performance level of the existing building is reduced, and the existing early warning and evacuation systems are required to be assessed and improved if not adequate to support the increase in occupant load.

Evaluation and Upgrading of Early Warning/Evacuation as per Table 11.4.3.3.

- a) Access to exit widths based on occupant load in Subsection 3.3.1.

Adequate access to exit widths will be required in the design for the fit-up of the restaurant.

b) Exit widths based on occupant load in Subsection 3.4.3

Adequate exit widths based on occupant load will be provided with the 900 mm wide exit stair (exit capacity of 97 persons) and the existing width of approximately 1100 mm for the central egress stair (egress capacity of 119 persons), and the standard width of exterior exit doors (standard 900 mm wide exit door capacity is 147 persons).

c) Exit signs in Subsection 3.4.5.

As the building is greater than 2 storeys in building height and the occupant load is expected to be greater than 150, exit signs will be required over or adjacent to every exit door.

d) Lighting of exits and access to exits, and emergency lighting in Subsection 3.2.7.

Lighting of exits, lighting of access to exits and emergency lighting will be required to suit the new floor layout in accordance with Subsection 3.2.7.

e) Fire alarm system in Subsection 3.2.4.

The tower fire alarm system will be extended to Grant House since it is considered to be the same building as the tower.

f) Smoke alarms in Subsection 9.10.19.

The requirements for smoke alarms are not applicable as the proposed use does not include a dwelling unit.

g) Travel distance and number of exits in other Parts of the Code

Part 3 contains the following key requirements for travel distance and exits:

- Maximum 45 metres travel distance in a sprinklered floor area
- Two exits for each floor area
- Exits are fire separated from the remainder of the building (fire-resistance rating is the same as the floors)
- A minimum distance between exits of half the diagonal of the floor area, or, the floor area is divided by a fire separation

As previously indicated, Grant House is proposed to be served by a new exit stair and the central heritage egress stair. This approach is discussed further in Section 5.10.

h) Smoke control measures as per Subsection 3.2.6.

The tower is a high building and is subject to smoke control measures including separation of above and below grade stairs, natural pressurization of above grade

stairs, mechanical pressurization of below grade stairs, and measures to control smoke movement via elevator shafts and vertical shafts that extend below the first parking level.

Grant House is part of the same building, but is only 3 storeys in height. As such, a pressurized vestibule is proposed on the Grant House side of the door between Grant House and the tower to separate the low-rise Grant House from the high-rise tower. As previously indicated this vestibule will be an unrated fire separation, and hold-opens may be installed on the doors to release on fire alarm or local smoke detection. This feature is based on the principles of Measure N of Supplementary Standard SB-4.

Additional smoke control measures are not proposed for Grant House.

- i) Door release hardware as per Articles 3.3.1.12. and 3.4.6.15.

Doors in an access to exit are required to be readily operable in travelling to an exit without requiring keys, special devices or specialized knowledge of the door opening mechanism. Hardware is required to operable by one hand with a single releasing operation. Exit doors serving an assembly occupancy of more than 100 persons requires listed panic hardware.

Washrooms and Ventilation

Washrooms will be required in the restaurant fit-up to satisfy the requirements of Subsection 3.7.4. for the restaurant occupant load. Ventilation systems will be required to serve the new occupant load to meet Sentence 6.2.2.1.(2).

5.8 Change of Major Occupancy

The use of the third floor is proposed to be changed from a Group C major occupancy to a Group A, Division 2 major occupancy.

The hazard index (HI) is calculated to assess any requirement to upgrade. For the purposes of this analysis Grant House is considered a 3 storey building with a building area of 280 m² since the size of the tower does not influence the hazard of the use within Grant House.

The HI for the existing 3rd Floor that includes the dwelling unit is 3 (Table 11.2.1.1.I). The HI for the existing Ground and 2nd Floor restaurant is 6 (Table 11.2.1.1.C.). The HI for the new restaurant use on the 3rd Floor is 6 (Table 11.2.1.1.C.).

Since the new hazard index of the 3rd Floor is greater than the existing index, there is a reduction in performance level and the construction index is required to be evaluated.

Evaluation of Construction Index (CI)

To compensate for the reduction in performance level, the building is required to be upgraded to a construction index of 6 to match the new hazard index of 6. The existing building has a construction index (CI) of 3 based on combustible

construction, no fire resistance rating over the basement, no fire resistance rating for the roof, and a 30 minute fire resistance rating for other floors.

Based on Table 11.4.3.4.A., to upgrade from a CI of 3 to a CI of 6 with combustible construction requires a 1 hour rating plus a sprinkler system. The sprinkler system in the tower will be extended to provide coverage to Grant House.

The wood joist floor assemblies are required to be upgraded to provide a 1 hour fire resistance rating. The existing ceiling assemblies vary in construction from plaster on wood lath to single and double layers of 16 mm thick gypsum board. One or two layers of 16 mm Type X gypsum board will be added to the underside of floor assemblies to achieve two layers throughout. This will provide a 60 minute fire resistance rating for all floor assemblies (based on Table 2.3.12. of SB-2). This design is appropriate provided no openings are located within the ceiling membrane.

The heritage cove molding in the main dining areas has been confirmed to be made of plaster, and is therefore proposed to be retained at these ceiling/wall junctions. New gypsum board will butt into the molding and small pieces of wood trim will be overlaid to maintain a heritage look at the transition.

High Building Requirements

In addition to providing washrooms and ventilation to suit the new occupant load and major occupancy (see previous section), an assessment high building requirements is required due to the change in major occupancy since Grant House will be joined to the high-rise tower, although Grant House is not within the high building criteria itself.

- **Smoke control:** As stated above, a pressurized vestibule (located in Grant House) is proposed to separate the low-rise and the high-rise portions of the project and to reduce the risk of smoke movement between Grant House and the tower. Additional smoke control measures are not proposed for Grant House.
- **Smoke venting:** The existing windows of Grant house are available for smoke venting.
- **Fire alarm system:** The tower fire alarm system will be extended to provide coverage in Grant House. This is not proposed to include voice communication capabilities since the floor areas in Grant House are limited in area, they are maximum 3 storeys from grade, and they are fire separated from the tower. The height of Grant House floor areas do not have the same risk as the high-rise tower that emergency responders will not be able to communicate to the control centre or to occupants.
- **Emergency power:** Emergency power duration for Grant House emergency lighting and exit signs is proposed to be for 30 minutes since egress times in Grant House are much shorter than in a high building where 2 hour emergency power is required.

5.9 Other Considerations

Spatial Separation

Grant House will retain existing windows and door openings on the north, east and south elevations with the exception of a new door on the north exterior wall facing the pocket park. As such, spatial separation requirements for the north exposing building face have been calculated. The north exposing building face of Grant House is 170 m², and the area of unprotected openings is 8.6 m² which represents 11% of the exposing building face. This requires a 1.2 metre limiting distance as per Table 3.2.3.1.C. for a sprinklered building.

Since there is a 15.95 metre distance between the north exterior wall of Grant House and the church, the remaining limiting distance for the church's south wall is 14.75 metres. This limiting distance will be adequate for the south wall of the church (approximately 2 storeys building height) since it has only one small unprotected opening at the top of the wall near the apex of the roof.

Barrier-Free Design

While the ground floor elevation is greater than 200 mm above grade, and there is no elevator serving Grant House, barrier-free design of OBC Section 3.8. is recommended to be applied voluntarily and as much as practicable to the renovations.

5.10 Performance Level

The approach to Grant House renovations is based on the fundamental principle of Part 11 that the performance level of a building after construction shall not be less than the performance level of a building prior to construction or extension. The performance level of the building as a whole is proposed as the benchmark when evaluating the renovations in Grant house, and in particular when evaluating the proposed exiting configuration.

Performance Level Prior to Construction

Grant House has never had sprinkler protection. A fire in an unsprinklered building is likely to grow larger in a shorter period of time relative to an unsprinklered building, reducing the time available for egress and increasing the risk to firefighters.

The former restaurant and apartment had the following exits and egress:

- Restaurant Ground Floor: three exit doors directly to the outside
- Restaurant 2nd Floor: one exit (the rear fire escape), and one egress (the central heritage stair)
- Apartment 3rd Floor: one exit (the rear fire escape), and one egress (the central heritage stair)

- Restaurant storage/office in the basement: one exit (rear stairs and door at grade with headroom and hardware deficiencies), two means of egress (the central heritage stair, and rear interior stairs)

The performance level prior to construction is characterized by three primary features: the lack of sprinkler protection, floor assemblies with a fire resistance rating less than 1 hour, and the provision of one exit (fire escape) and one egress for the 2nd and 3rd floors. It is noted that the performance level of the fire escape did not meet minimum Building Code requirements as it was only 710 mm in width versus minimum 900 mm required to serve the 2nd Floor.

Performance Level After Construction

The performance level after construction is characterized by sprinkler protection, floor assemblies with a 1 hour fire resistance rating, and an exiting strategy that is at least equivalent to the former exiting strategy for the 2nd Floors and below. The performance level of the 3rd Floor after construction is equivalent to a mezzanine that the Code would permit if Grant House had a larger footprint for the Ground Floor.

Sprinkler protection in Grant House will function to control the size and spread of a fire, and to reduce smoke production. This will increase the time available for egress and will assist firefighter suppression activities.

The 1 hour fire resistance rating for floor assemblies will reduce the risk of premature spread of fire through floor assemblies, and will also reduce the risk of collapse during firefighting operations.

The 3 storey restaurant will have the following exits and egress:

- Restaurant Ground Floor: three exits (main exit doors to Elgin Street, north exit stair, west door to Winter Garden and access to multiple exits from Winter Garden)
- Restaurant 2nd Floor and 3rd Floor: one exit (new interior stair), one egress (central heritage stair)
- Restaurant storage/office in Basement: one exit (new interior stair), one egress (central heritage stair)

This exiting approach is supported by the following:

1. *The Ground Floor exiting is compliant.* At least two exits are provided from this floor area.
2. *The 2nd Floor exiting matches the previous 2nd Floor exiting configuration.* In addition, the new exit will provide the minimum required exit width. The 2nd Floor use will remain unchanged and the occupant load is expected to be similar to the previous restaurant.
3. *The 3rd Floor occupant load will be limited to 60 persons.* This limit reflects the maximum occupant load in a room with a single means of egress.

Signage is required to be posted and this will be documented in the Fire Safety Plan.

4. *If the 3rd Floor was able to be considered a mezzanine relative to the tower, the 3rd Floor would meet the criteria to be served by a single egress.* Sentence 3.2.1.1.(4) permits a “10% mezzanine” if it does not exceed 10% of the floor area in which it is located, and, if the area of the mezzanine does not exceed 10% of the area of the suite in which it is located.

As per the National Building Code intent statements, the Code permits mezzanines that meet the conditions of Sentence 3.2.1.1.(4) to be exempted in the calculation of building height (i.e. to not be considered a storey) on the basis that the configuration does not pose an undue fire safety risk to persons.

Grant House is expected to operate as a separate restaurant suite, and as such, the 3rd Floor exceeds 10% of the overall area of the restaurant suite. The 3rd Floor represents approximately 20% of the suite area (the suite consists of the Basement, Ground and 2nd Floors). Nevertheless, the “10% mezzanine” concept is raised to consider the performance level of a similar situation permitted by the Code when the 3rd Floor of Grant House is compared to the floor area of the 2nd Floor of the tower.

The 3rd Floor has an area of 140 m², which is approximately 5% of the area of the 2nd Floor of the tower (roughly 2800 m²). As a “10% mezzanine” under Sentence 3.2.1.1.(4) it would be permitted to be served by a single means of egress since the following conditions of Sentence 3.4.2.2.(4) are satisfied:

- a. The “mezzanine” would not be required to terminate at a vertical fire separation under Clause 3.2.8.2.(1)(d),
- b. The total occupant load of the mezzanine is not more than 60,
- c. The area of the 3rd Floor does not exceed the 200 m² limit of Table 3.3.1.5.B for a Group A occupancy, and
- d. The travel distance does not exceed 25 metres from any point on the mezzanine to the egress or exit door. (Travel distance is measured to the 3rd Floor egress or exit door since the 2nd Floor has 2 egress doorways).

In summary, if the 3rd Floor was able to be considered a mezzanine relative to the tower, the 3rd Floor would meet the criteria to be served by a single egress.

5. *The travel distance to an exit on each floor is approximately half the maximum permitted 45 metre travel distance.* The small floor areas of Grant House result in a maximum 25 metres travel distance from any point to an exit door. This means that occupants will reach an exit in approximately half the time as permitted by the OBC. It is noted that 25 metres is the maximum travel distance permitted when floor areas are served by a single exit, and

when rooms are served by a single means of egress. Also, the overall travel distance from the 3rd Floor landing of the central heritage stair down to the Elgin Street exit doors is also a maximum of 25 metres.

6. *Extra smoke detection is proposed on the ceiling on each level near the central heritage stair.* This will provide early notification to occupants and will increase the available egress time.

Summary

The proposed approach to exiting in the Grant House is intended to achieve an acceptable level of life safety performance while preserving important heritage features. The exiting strategy described in this report equals or improves on the existing performance level for the Ground, 2nd and Basement storeys. The performance level of exiting for the 3rd storey is acceptable since it is comparable to the performance level of a “10% mezzanine” relative to the 2nd storey of the building, and the compensating feature of increased smoke detection is proposed to increase safe egress time for occupants of the 3rd storey.

6. OFFICE TOWER

6.1 Occupant Load

The occupant loads for the tower are indicated in Table 1 in the Appendix.

6.2 Construction Requirements

Section 4.2. summarized the building size, use and occupancy. As a building with multiple major occupancies, the most restrictive construction requirements are applicable. The construction requirements for a building of this size are the same for all major occupancies (Group A, Division 2, Group D, Group E, Group F, Division 3). The construction requirements of Article 3.2.2.49. for a Group D major occupancy, are as follows (also Articles 3.2.2.23. for Group A, Division 2, 3.2.2.57 for Group E, 3.2.2.73. for Group F, Division 3):

Construction:	Noncombustible construction
Sprinkler System:	Required (as a high building)
Floor assemblies:	Fire separations with a minimum 2 hour fire resistance rating
Load-bearing assemblies:	Fire resistance rating not less than the supported assembly
Roof:	No fire resistance rating required

The fire resistance rating of assemblies is required to be determined either by testing to ULC-S101, “Fire Endurance Tests of Building Construction and Materials” (i.e. the assembly needs a ULC or cUL design number), or, on the basis of Supplementary Standard SB-2 “Fire Performance Ratings”.

6.3 Fire Department Access

6.3.1 Fire Department Access Route

The tower and Grant House will be fully sprinklered, and as such, Fire Department access is only required to the principal entrance of the building to serve upper levels. The principal entrance for Fire Department access is proposed to be off Gloucester Street on the south side of the tower since this is where firefighter can directly access the main lobby and the Central Alarm and Control Facility. Firefighters can also respond to the main entrance to Grant House at Elgin Street.

For the basement parking levels, direct access for the Fire Department is provided via the tower’s 3 exit stairs that discharge through exit corridors or an exit lobby to the north and south building faces.

The access route along Gloucester Street is to meet the following characteristics:

- The route is located so that the principal entrance is not more than 15 metres but not less than 3 metres from the access route.
- The route is a minimum of 6 metres in width.
- A minimum 12 metre centerline turning radius is to be provided.
- A minimum overhead clearance of 5 metres is to be provided.
- A maximum change in gradient of 1 in 12.5 for a minimum distance of 15 metres is permitted.
- The route is required to be provided with heavy duty asphalt or other surface suitable to heavy vehicles.
- The route is a public thoroughfare.

6.3.2 Fire Hydrants and Fire Department Connection

The Fire Department connection(s) serving the sprinkler system and standpipe system will be accessible from the Fire Department access route.

A hydrant is to be located within 45 metres of the Fire Department connection.

The Fire Department connection(s) are to be located on the outside of the building adjacent to a street or an access route at a height within 300 mm to 900 mm above ground level.

6.4 Spatial Separation

Spatial separation requirements are based on Table 3.2.3.1.C. of the OBC as this building will be fully sprinklered and will contain a Group D major occupancy. Since a limiting distance of at least 9 metres is provided on the Elgin Street and Gloucester Street elevations (measured to the centerline of the street), 100% unprotected openings are permitted on these elevations and there are no restrictions on wall construction.

Unlimited unprotected openings are permitted on the ground floor on the south and east elevations as per Sentence 3.2.3.10.(2) since the limiting distance is not less than 9 metres to the centerline of the street.

Table 2 indicates the percentage of unprotected openings permitted on the north and west elevations. Glazed openings that exceed the permitted amount on the north elevation will be protected with window sprinklers that meet Article 3.1.8.18.

Table 3 indicates the required wall construction from Article 3.2.3.7. The fire-resistance rating requirement applies to the portion of the wall that exceeds the permitted amount of unprotected openings, which may be different than the actual amount of glazing. The fire-resistance rating of the exterior wall is based on exposure from the inside of the building only.

Table 2: Unprotected Openings – North and West Elevations

Floor	EBF (m ²)	Available Limiting Distance for glazing (m)	Permitted U.O.		Actual U.O.	
			%	m ²	%	m ²
North Elevation						
G	512	0	0	0	0	0
2-3	396	3.7	27	107	Up to 24%	Up to 96 m ²
4-6	312	3.7	27	84	24%	75 m ²
7-17	219	3.7	27	59	Up to 25%	Up to 54 m ²
18-21	194	3.7	27	52	24%	46 m ²
22-23	215	3.7	27	58	8%	18 m ²
West Elevation						
G	152	0.3	0	0	0	0
2-3	115	0.3	0	0	0	0
4-6	109	5.9	63	69	47%	52 m ²
7-17	97	5.9	68	66	Up to 54%	Up to 52 m ²
18-21	97	12.7	100	97	< 100%	-
22-23	108	12.7	100	108	< 100%	-

Table 3: Exterior Wall Construction – North and West Elevations

Floor	EBF (m ²)	Available Limiting Distance for walls (m)	Permitted U.O. (%) to determine wall construction	Requirements		
				Construction	Fire-Resistance Rating	Cladding
North Elevation						
Ground	512	0.3	0%	Non-Combustible	1-Hour	Non-Combustible
2-3	396	0.3	0%	Non-Combustible	1-Hour	Non-Combustible
4-6	312	0.3	0%	Non-Combustible	1-Hour	Non-Combustible
7 th (East Stair/Elevator)	32	0.3	0%	Non-Combustible	1-Hour	Non-Combustible

Floor	EBF (m ²)	Available Limiting Distance for walls (m)	Permitted U.O. (%) to determine wall construction	Requirements		
				Construction	Fire-Resistance Rating	Cladding
7-17	219	3.7	27%	--	45-Minute	--
18-21	194	3.7	27%	--	45-Minute	--
22-23	215	3.7	27%	--	45-Minute	--
West Elevation						
Ground	152	0.3	0%	Non-Combustible	1-Hour	Non-Combustible
2-3	115	0.3	0%	Non-Combustible	1-Hour	Non-Combustible
4-6	109	5.9	63%	--	45-Minute	--
7-17	97	5.9	68%	--	45-Minute	--
18-21	97	12.7	100%	--	--	--
22-23	108	12.7	100%	--	--	--

6.5 Exposure Conditions at Exits and Other Fire Compartments

Unprotected openings in exterior walls of separate fire compartments that expose each other do not require additional protection since the project is sprinklered, as permitted by Sentence 3.2.3.14.(3). Glazing in the west face of the 3rd Floor of Grant House is not proposed to be protected from exposure to the Winter Garden glazing at that level since both compartments are sprinklered.

If there were windows exposing an exit door, windows in a stairwell or path of travel from an exit, those openings would be required to be protected or have sufficient clearance to avoid exposure conditions.

6.6 Fire Separations and Compartmentation

The applicable fire separations based on intended use are indicated in Table 4.

Table 4: Location and Rating of Fire Separations

Location	Fire Separation / Fire Resistance Rating
Major Occupancy Group E to Group A, Division 2 (Ground Floor)	2 hour rated fire separation
Exit Stairwells	2 hour rated fire separation
Public Corridors	Unrated fire separation
Loading Dock	1 ½ hour rated fire separation

Location	Fire Separation / Fire Resistance Rating
Vertical Service Shafts	1 hour rated fire separation
Elevator Shafts	1 ½ hour rated fire separation
Elevator Machine Room	1 ½ hour rated fire separation
Main Electrical Room	1 hour rated fire separation
Electrical Rooms for Low Hazard Equipment	No fire separation required
Mechanical Service Rooms (containing fuel-fired equipment)	1 hour rated fire separation
Mechanical Rooms (not containing fuel-fired equipment) ¹	No fire separation required
Electrical Equipment Vault	3 hour fire rated separation if not provided with an automatic extinguishing system 2 hour fire rated separation if provided with an automatic extinguishing system
Fire Pump Room	1 hour rated fire separation recommended (NFPA 20)
Garbage and Recycling Rooms	1 hour rated fire separation
Storage Garage to Remainder of Building	1 ½ hour rated fire separation
Janitor's Closets	Unrated fire separation
Vestibule to Exit Stairs on Parking Levels	Unrated fire separation
Vestibule to Elevator on Parking Levels	2 hour rated fire separation
Emergency Generator Room	2 hour rated fire separation
Central Alarm and Control Facility	No fire separation required

The bicycle storage on the parking levels is not proposed to be fire separated from vehicle storage since the storage of bicycles is a related and compatible use.

¹ Incidental mechanical service rooms that do not contain fuel fired appliances and contain only limited equipment are not required to be fire separated from the remainder of the building. However, where equipment contributes to the ongoing operation of the building, a voluntary fire separation may be considered.

All vertical fire separations are required to be continuous and may extend to the underside of a continuous horizontal fire separation having the same rating as required for the vertical assembly. The continuity of a fire separation is required to be maintained where it abuts another fire separation, a floor, a ceiling, a roof, or an external wall assembly².

Shafts including an exit enclosure that penetrate a fire separation are required to terminate so that smoke-tight joints are provided where the shaft abuts or intersects a floor, a roof slab or a roof deck.

Doors and Closures

The fire protection ratings of doors and closures are shown in Table 5.

Table 5: Fire Protection Ratings of Doors and Closures in Fire Separations

Fire Resistance Rating of Assembly	Fire Protection Rating of Door
Unrated	No rating applicable
45 minutes	45 minutes
1 hour	45 minutes
1 ½ hour	1 hour
2 hours	1½ hour
3 hours	2 hours

Closures in exits are required to have a minimum temperature rise limit of 250° after 1 hour as per Article 3.1.8.15. Glazing area to be limited to 0.0645 m² per door and per panel not in a door.

All doors in fire separations are required to be provided with self-closing devices and be equipped with positive latching mechanisms which are designed to hold the door in the closed position after each use.

Firestopping and Fire Dampers

Service penetrations through fire separations are required to be firestopped in accordance with Article 3.1.9.1. Penetrations are to be sealed by a listed firestop system that has an F rating not less than the fire protection rating for closures in the fire separation in conformance with Table 3.1.8.4. (e.g., a 2 hour rated fire separation requires a firestop system with an F rating of 1 ½ hours).

² Except as permitted by Sentence 3.6.4.2.(2).

Fire dampers are required to be installed in ducts that penetrate assemblies that are required to be fire separations as per Article 3.1.8.7. with exceptions for fire damper installations listed in Article 3.1.8.8.

Sprinkler Protected Glazed Wall Assemblies

Sprinkler protected glazed wall assemblies are proposed in the following locations:

- North exterior wall, 4th through 21st Floors on select glazing to reduce the amount of unprotected openings
- West wall of the Winter Garden at the 3rd Floor to separate the interconnected floor space from the remainder of the floor area

Sprinkler protected glazed wall assemblies are required to be constructed in accordance with the requirements of ULC/ORD C263.1, “Sprinkler-Protected Windows Systems”.

As required by Sentence 3.1.8.18.(2), these wall assemblies require a maximum rating of 2 hours, and they do not form part of a firewall or an exit serving this high building.

6.7 High Building Features

The building is required to satisfy the provisions of Subsection 3.2.6. of the OBC as the height of the building between grade and the floor level of the top storey is more than 36 metres. The building is fully sprinklered and will be provided with measures to limit smoke movement per Subsection 3.2.6.

6.7.1 Control of Smoke Movement

Exit stairwells are to be vented to the outdoors at the bottom or near the bottom of the stair by manually (or automatically) opening the exterior doors at grade, or by a connection to a fire protected horizontal shaft between the stair and the exterior. In this case, two of the above grade stairwells discharge to grade through exit corridors, and the other above-grade exit stairwell discharges through a small exit lobby. All doors in the exit corridors and exit lobby between the exterior and the stairshaft are to have the ability to be manually held open to accomplish the natural pressurization of the stairwells.

The below grade exit stairwells are to be separated from the above grade exit stairwells with a 2 hour rated fire separation. The below grade exit stairwells are to be mechanically pressurized during a fire emergency to limit the volume of contaminated air after the start of a fire as per Sentence 3.2.6.2.(2).

When fans are used to mechanically pressurize a stairwell, they are to be independent of all other air handling systems in the building, be treated as

an extension of the exit compartment, and, if fans or ducts are located outside of the stairwell, are to be protected with a 2 hour fire rated enclosure.

The Ground Floor is the lowest exit storey. Elevator shafts that extend below the 1st Parking Level are to be protected by vestibules at the elevator shaft entrances on below grade levels to limit the movement of smoke via these shafts.

Vertical shafts that extend lower than the 1st Parking Floor slab are required to be firestopped at this slab level, or alternately to be vented to the outdoors at the top of the shaft.

Air-moving fans that serve more than 2 storeys are to have a manual switch at the Central Alarm and Control Facility so they may be stopped during a fire emergency. This does not apply to kitchen and bathroom exhaust fans, and fans that are used for smoke venting.

6.7.2 Emergency Operation of Elevators

The elevators will serve all floors and, as required by the OBC, are to satisfy the requirements below.

- A manual emergency elevator recall feature is required.
 - The manual emergency elevator recall is to be provided with key-operated switches located in a conspicuous location at the elevator lobby on the recall level and at the central alarm and control facility (CACF).
 - Keys are required to be provided in a box (suitably identified) located on the outside of the elevator hoist way near the CACF, and also kept at the CACF.
- In-car emergency service switches in the elevator car are required.

The ground floor should be designated as the recall level. An alternate recall level is not required by the OBC, but is required to meet TSSA requirements. The 2nd floor should be designated as the alternate floor recall level. Coordination of the recall level is via the fire alarm system.

Automatic emergency recall is not required in this fully sprinklered building as per the OBC. However, TSSA provisions will require automatic recall. Automatic emergency recall can be activated by the fire alarm system and per TSSA, is required to be activated by smoke detectors in elevator lobbies.

Please note that TSSA provisions may override the provisions of the OBC.

6.7.3 Fire Fighter's Elevator

At least one elevator is required to have the capability to be used by Fire Fighters in the event of an emergency. This elevator is required to serve all floors normally served by the elevator system.

The elevator shaft is to be protected with a closure at each shaft opening that is equipped with an interlock mechanism that remains mechanically engaged and electrical continuity is maintained in the interlock circuits and associated wiring is operational for a period of not less than 1 hour when the assembly is subjected to the standard fire exposure described in CAN4-S104-M, "Standard Method for Fire Tests of Door Assemblies."

The elevator is required to have a minimum usable platform area of 2.2 m² and the ability to carry a load of 900 kg within 1 minute to the top floor that the elevator serves from the landing on the storey containing the entrance for Fire Fighter access.

6.7.4 Smoke Venting

Smoke venting to aid Fire Fighters is required for all storeys. This can be provided by openable windows or the floor area can be vented by the building's exhaust system.

The air handling systems serving the building can be sized to exhaust to the outdoors at the rate of not less than six air changes per hour from any floor. The system need only provide six air changes per hour for one sprinklered storey at a time. The fans that provide the venting are required to be provided with emergency power for a minimum of 2 hours and electrical power conductors for these fans and dampers are required to be designed to be protected for the 1 hour fire exposure.

Manual controls to operate the building fans that provide smoke venting are to be provided at the Central Alarm and Control Facility. The controls are to consist of individual floor selector switches which will operate dampers as required to isolate the selected floor, operate exhaust and return fans in 100% outdoor air mode.

6.7.5 Central Alarm and Control Facility

A central alarm and control facility (CACF) is required to be located on the ground floor so that it is readily accessible by Fire Fighters. The CACF will be accessed from the Gloucester Street lobby and located near the main bank of elevators.

The CACF is to include the fire alarm annunciator, indications and controls for fire alarm signals, and the means to manually actuate or shut down certain building elements or systems. A manual switch at the CACF is required to control any air-moving fan in the building that serves more than 2 storeys except for kitchen and bathroom exhaust fans.

Key features of the CACF are indicated below.

- The CACF is required to be located on the storey containing the entrance for Fire Fighter access and readily accessible to fire fighters.
- The construction of the CACF is required to limit background noise that may interfere with the operations in the CACF. (A fire separation is not required by the OBC but a 1 hour rated fire separation is recommended if the main fire alarm control panel is within the CACF to comply with ULC-S524 provisions).
- Audible and visual signals features are indicated below:
 - Signals are required to indicate audibly and visually, alert signals and alarm signals.
 - A switch to silence the audible portion of the alarms.
 - A switch to indicate visually that the audible portion of the alarm has been silenced.
 - A means to transmit the alert signals and alarm signals to the fire department as per Article 3.2.4.7.
 - A means to activate alarm signals selectively to any zone or zones.
 - A visual indication that the elevator is on emergency recall.
- An annunciator is required as per Article 3.2.4.8.
- A means to control the voice communication system so that messages can be sent to all loudspeakers simultaneously, individual floor areas and exit stairwells.
- A means to release hold-open devices on doors to vestibules.
- A means to manually actuate alarm signals selectively to any zone or zones, and a means to silence the alarm and alert signals to provide voice communication messages as per Sentences 3.2.4.22.(2) and (3)
- A means to communicate with telephones in elevator cars separate from connections to the Fire Fighter's telephone if telephones are required in the elevator cars (by the Elevating Devices Act).
- A means to indicate visually individual sprinkler system waterflow signals.

- A means to indicate visually and audibly sprinkler system supervisory signals and trouble signals.
- A switch to silence the audible portion of a supervisory signal or a trouble signal.
- A visual indication that the audible portion of a supervisory signal or a trouble signal has been silenced.

6.7.6 Emergency Power

Emergency power is required to be provided to serve the fire alarm system, exit lights, emergency lighting, all elevators including the Fire Fighter's elevator, smoke venting components, stair pressurization fans and the fire pump.

With the exception of the fire alarm system, the emergency power supply is required to supply 2 hours of power under full load for all required systems. Emergency power for the fire alarm system is required to include 2 hours of full operation following 24 hours of supervisory operation. The emergency power for the fire alarm system can be provided from either a generator, batteries or a combination of both.

6.7.7 Protection of Electrical Conductors

Electrical conductors that are used in conjunction with the fire alarm system, for fans for smoke venting and stair pressurization, emergency lighting, and for the emergency operation of elevators are required to satisfy the following key features:

- Conform to ULC-S139, "Fire Test for Evaluation of Integrity of Electrical Cables", including hose stream application to provide a minimum circuit integrity rating of 1 hour **OR** the electrical conductors are to be located in a service space that does not contain any combustibles and is separated from the remainder of the building by a fire separation with a 1 hour fire resistance rating.
- The electrical conductors are those that extend from the source of emergency power to the equipment served or the distribution equipment supplying power to the equipment served if both are located in the same room.
- If a fire alarm transponder or annunciator is connected to, but located in, a different fire compartment than the central processing unit or another transponder, all wiring between the transponder or annunciator and the central processing unit or other transponder are required to be protected against exposure to fire (i.e., conform to ULC-S139 or be fire separated in a room with a 1 hour fire resistance rating, see above).

- The fire alarm branch circuits within a storey that connect transponders and individual devices are not required to be protected against fire exposure.
- Electrical conductors for the operation of the Fire Fighter's elevators are required to be installed in a service space that does not contain any combustibles and is separated from the remainder of the building by a fire separation with a 1 hour fire resistance rating, or, protected against fire exposure from the service entrance of the emergency power supply or the normal service entrance of the emergency power supply to the equipment served so that operation of the elevator can continue for a period of 1 hour when tested with respect to CAN4-S101-M, "Fire Endurance Test of Building Constriction and Materials."

6.7.8 Interior Finishes

Interior finishes in this high building are subject to limitations on flame spread rating and smoke developed classification.

Interior finishes for wall, ceiling and floor surfaces are required to meet the limitations of Subsection 3.1.13. and Article 3.1.5.10. which include the following:

- All wall, ceiling, and floor surfaces of exit stairs, exit lobbies, service rooms and service spaces are limited to a maximum flame spread rating of 25, and maximum smoke developed classification of 50.
- Up to 10% of the area of a wall or ceiling in an exit, exit lobby or corridor not within a suite is permitted to have a flame spread rating not more than 150 and a smoke developed classification not more than 300.
- Elevator cars and vestibules are limited to a flame spread rating of 25 and a smoke developed classification of 100 for wall and ceiling surfaces. Floor surfaces of elevator cars are limited to a flame spread rating of 300 and a smoke developed classification of 300.
- Other walls are subject to a maximum flame spread rating of 150. Smoke developed classification limitations are waived as the building is sprinklered.
- Combustible interior ceiling finishes are subject to a maximum flame spread rating of 25, except that up to 10% of the ceiling area within a fire compartment can have a flame spread rating of up to 150.
- All wall and ceiling finishes are subject to the flame spread rating on any exposed surface and on any surface that would be exposed by cutting through the material in any direction.

- Flame spread ratings and smoke developed classifications are subject to measurement using ULC-S102 and ULC-S102.1

West Wall of Grant House in the Winter Garden

The west exterior wall of Grant House will become an interior wall with the construction of the tower. This wall is predominantly painted brick, however the 2nd Floor has a mansard style roof covered with wood shingles. The roof will be modified slightly during this project to recreate the roof line once the old fire escape door is removed, and to intersect with the tower curtain wall. In addition, there are wood heritage elements on the west elevation of Grant House such as the wood eaves at the bottom of the mansard roof, and the wood moldings and cornices over the 2nd Floor windows.

A combustible interior wall finish is permitted in the tower provided it is not more than 25 mm thick, and has a flame-spread rating not more than 150 on any exposed surface, or any surface exposed by cutting through the material.

The wood shingles and wood elements are proposed to be retained on the west elevation of Grant House within the Winter Garden since these are heritage elements of the building, they are expected to provide a flame spread rating of 150 (similar to unfinished lumber in Table 3.1.1.A. Supplementary Standard SB-2), and the wood shingles will be protected from fire originating in Grant House by interior gypsum board and wired glass at the openings.

6.8 Interconnected Floor Space

The Ground and 2nd Floors of the tower are designed to be an interconnected floor space as the 2nd Floor offices will be open to the “Winter Garden”.

This space is exempted from special protection under Sentence 3.2.8.2.(6) since the interconnected floor space will consist of only the first and second storeys, it will be sprinklered, and the space will contain only Group A, Division 2, Group D, Group E, and Group F Division 3 occupancies.

The ceiling of the interconnected floor space will be at the 3rd Floor ceiling level, however a 2 hour rated fire separation will be provided to the 3rd Floor office areas with a sprinkler protected glazed wall assembly.

6.9 Egress and Exits

6.9.1 Number of Exits and Travel Distance

Each floor is served by a minimum of two exits. The following exits will be provided in the tower:

- The Ground through 22nd Floors are served by Stair 1 and Stair 2 in the core area.

- The basement levels are served by Stair 1 and by Stair 3 located at the northeast corner of the building.
- The northeast Stair 3 also serves the 2nd through 7th Floors and provides direct access to the 7th Floor public terrace.
- The Ground Floor is served by exit doors at the north entrance, Pocket Park and Gloucester Street entrances that lead directly outside.

The following egress/exits widths are applicable for this building:

- All exit stairs and exit corridors require a minimum width of 1100 mm.
- All exit doors require a minimum width of 790 mm.

The maximum travel distance from the most remote point in the floor area to an exit is permitted to be 45 metres since the building is sprinklered. This travel distance is permitted to be measured to the egress door into a public corridor as per Sentence 3.4.2.4.(2).

The maximum travel distance on any floor is 41 metres. On the office floors the travel distance is measured to the egress door into the public corridor. On the ground floor, the travel distance is measured from the most remote point in the floor area to an exit.

6.9.2 Number of Means of Egress

Rooms and spaces (including terraces) are permitted to be served by a single egress door if the occupant load of the room is a maximum of 60, the area of the room does not exceed the maximum in Table 3.3.1.5.B. (i.e. 300 m² for Group D occupancy, 200 m² for Group E occupancy) and the travel distance to the egress door is maximum 25 metres.

The ground floor Coffee Shop will meet the conditions to be served by a single egress door to the exterior. The ground floor Commercial Space will require at least two egress doors due to the suite size and to achieve adequate travel distances.

The 23rd Floor is a rooftop enclosure for mechanical equipment, and is required to be provided with two means of egress if it is more than 200 m² in area.

6.9.3 Distance Between Exits

Except for floors served by a public corridor, the minimum distance between the exits from a floor area is to be not less than one half of the maximum diagonal dimension of the floor area and is measured as the shortest distance that smoke will travel between exits. Where a public

corridor is provided, the minimum distance between exits is to be 9 metres.

The distance between exits on the basement levels through the 7th Floor is more than one half the maximum diagonal dimension on the floor area, satisfying the requirements of the Code.

The distance between exits on the 8th through 21st Floors is approximately 12 metres which meets the Code since a public corridor constructed as an unrated fire separation is provided on these floors.

The exits on the mechanical penthouse floors will need to be separated by at least half the maximum diagonal dimension of the floor area with the construction of a fire separation.

6.9.4 Exit Capacity

The Code prescribed exit capacity factor of 6.1 mm/person is applicable for doors. An exit capacity factor of 9.2 mm/person has been applied to the exit stairs since they are steeper than a 180 mm rise and a 280 mm run. Exit doors with a standard minimum width of 890 mm provide an exit capacity of 145 persons. Exit stairs with a standard width of 1100 mm provide an exit capacity of 119 persons.

The exit capacity available from each level of the building is indicated in the table below.

Table 6: Exit Capacity

Floors	Available Exits	Exit Capacity (persons)	Total Exit Capacity
Basement Levels B1, B2 and B3	Stair 1	119	238 persons/floor
	Stair 3	119	
2 nd -7 th Floors	Stair 1	119	357 persons/floor
	Stair 2	119	
	Stair 3	119	
8 th – 22 nd Floors	Stair 1	119	238 persons/floor
	Stair 2	119	

The Ground Floor is provided with many exit doors and will provide adequate exit capacity for the occupant loads indicated in Table 1 in the Appendix.

6.9.5 Exit Discharge

Stair 1 and Stair 2 discharge through exit corridors to the exterior at ground level. Stair 3 discharges through a small exit lobby at the north

building face. The exit lobby will satisfy the conditions of Sentence 3.4.4.2.(2):

- The lobby is not more than 4.5 m above grade,
- The path of travel to the outdoors is 5 metres which is less than 15 metres,
- The adjacent rooms to the lobby do not contain a residential or industrial occupancy,
- The lobby is within an interconnected floor space that meets the conditions to be exempted from special protection under Sentence 3.2.8.2.(6),
- The lobby will conform to the requirements for exits (e.g. services for other floor areas will not be located in the lobby),
- An unrated fire separation will be provided between the lobby and the assembly occupancies in the Winter Garden, and
- A 2 hour rated fire separation will be provided between the lobby and the exit stairwell.

6.9.6 Integrity of Exits

The OBC contains restrictions to ensure the integrity of exits and reduce the risk that the fire separation of exits will be compromised. The fire separation around exits may have openings only for exit doorways, wired glass and glass block, smoke control features, standpipe and sprinkler piping, and for electrical wires and cables and noncombustible piping that serves only the exit. Services that do not serve the exit are not permitted within the exit enclosure. Service rooms, storage rooms and washrooms are not permitted to open directly to an exit.

6.9.7 Door Swing

The following provisions are applicable to door swing:

- Doors that serve an occupant load of greater than 60 persons are to open in the direction of exit travel.
- Exit doors are to swing in the direction of exit travel.

6.9.8 Door Hardware

Doors in an access to exit are to be readily operable in the direction of egress travel without the use of keys, special devices or specialized knowledge of the door opening mechanism. The doors are also to be operable by one hand and be operable with a single releasing operation.

Doors in a barrier-free path of travel are to be designed so that they can be opened without tight grasping and twisting of the wrist.

Other key door hardware provisions are indicated below:

- Doors at the base of exit stair shafts are to have panic style hardware since the building has an occupant load of more than 100 persons. Electromagnetic locking devices are not permitted on these doors.
- All door opening hardware on fire rated doors are to be listed and labeled to indicate that it is appropriate for use on a fire rated door.
- Self-closing devices are to be installed on all doors in fire separations.
- Any dead bolts or supplementary locking hardware on egress doors will be interconnected to release with the operation of the lever hardware.
- Electric strike security hardware is permitted on exit and egress doors provided the doors allow free egress in the direction of egress travel at all times.

Electromagnetic locking hardware is permitted on egress and exit doors with the exception of at the base of exit stair shafts and any door serving an assembly occupancy having an occupant load greater than 100 persons (such as the 7th Floor Public Terrace). Signage and release provisions are required as per Sentence 3.4.6.15.(4).

6.9.9 Curved Stairs

The curved stairs between the Ground and 2nd Floor are for convenience only, and will be designed to meet the provisions for tapered treads in Article 3.4.6.8.:

- Treads with a minimum run of 240 mm, exclusive of nosings,
- Treads with a run between 255 mm and 355 mm when measured 230 mm away from the handrail at the narrow end of the tread,
- An inside radius that is not less than twice the stair width, and
- A handrail on each side.

6.9.10 Floor Identification

The OBC requires that the floors be identified with Arabic numerals and exit stair shafts be designated by upper case letters. The floor and stair identification is to be permanently mounted on each side of doors to exit stair shafts. Numerals and lettering are required to be 60 mm high, raised approximately 0.7 mm above the surface, be mounted at a height of 1500 mm and be contrasting in colour to the background.

6.9.11 Emergency Access to Floor Areas

Emergency access to floor areas is required since the building is more than 6 storeys in building height. Doors leading to the floor area from the exit stair are not permitted to have locking devices to prevent entry to:

- At least one of the three highest storeys, and
- Other floor areas at intervals of 5 storeys or less.

Electromagnetic locking devices are permitted on these exit doors provided all locking device release and signage provisions of Sentence 3.4.6.15.(4) are provided on both sides of the doors.

6.10 Fire Protection Systems and Emergency Power

6.10.1 Fire Alarm System

A fire alarm is to be provided due to the size of the building and the occupant load. The fire alarm system can operate as either a single stage system, thereby requiring total evacuation upon any alarm, or a two-stage system, which permits occupants to stay in the building until the alarm has been confirmed. The choice to implement a two-stage system will depend on the level of staff supervision and staff training.

Smoke detectors are to be installed in the following locations:

- At the top of each exit stair shaft and every third storey
- At doors equipped with hold-open devices

Duct smoke detectors are to be installed where an air handling system serves more than one storey or serves more than one suite in a storey.

Fire detectors and heat detectors are not required as the building will be fully sprinklered and the sprinkler system will be electrically supervised.

Where audibility levels may be affected by background noise, and where the ambient noise level is more than 87 dBA, visual signal devices are to be installed. It is recommended that all service and equipment rooms be provided with visual signals to supplement the required audible signals.

Manual pull stations are required near each exit of the building and near the principal entrance of the building.

The fire alarm system is required to have the following features:

- Except as noted below, audible signals are to be installed throughout the floor areas and are required to provide a minimum 65 dBA sound

pressure level and provide a minimum sound pressure level of 10 dBA over the ambient noise level.

- An annunciator is required in the vicinity of the principal entrance. This can be satisfied by the annunciator located in the CACF near the main entrance at Gloucester Street.
- Electrical supervision of all water flow and valve tamper switches is required, and the fire alarm system is to be monitored by an independent central station.
- Emergency power for the fire alarm system must be capable of providing supervisory power for a minimum of 24 hours followed by 30 minutes under full load.

6.10.2 Voice Communication System

A voice communication system is required in the building as the top storey of the building is more than 36 metres above grade. The system is required to have the following features:

- A 2-way communication system in each floor area with connection to the central alarm and control facility,
- Loudspeakers operated from the CACF that are designed and located to be audible and intelligible in all parts of the building except elevator cars,
- A means to selectively transmit the alarm signal to any zone(s) while maintaining an alert signal or selectively transmitting voice messages to any zone(s) in the building,
- A means to silence the alarm signal of a single stage fire alarm system, or the alert and alarm signals of a two stage fire alarm system, but only after the signals have sounded for not at least 30 seconds, and
- Emergency telephones located in each floor area near exit stair shafts.

6.10.3 Sprinkler System

All floor areas of the building are required to be sprinklered in accordance with the construction requirements of Subsection 3.2.2. of the Code. The sprinkler system is required to be designed, installed, and commissioned in accordance with NFPA 13.

6.10.4 Standpipe System

The building is required to be provided with a standpipe system since the building is greater than 3 storeys in building height. The standpipe system is required to be designed, installed, and commissioned in accordance with NFPA 14.

The standpipe system is to consist of one or more vertical risers to fire hose cabinets located on the floor area that are located within 5 metres of the exits and so that there is coverage of all areas of the building within 33 metres of the hose cabinet (based on a 30 metre hose and 3 metre hose stream length).

The hose cabinets are required to contain a 65 mm hose connection for Fire Department use and 38 mm hose up to 30 metres in length (requirement to depend on location of hose stations). The hose is required to be listed and provided with an adjustable fog nozzle.

6.10.5 Emergency Lighting

Emergency lighting is to be provided in the following locations:

- Exits
- Principal routes provided access to exits in an open floor area
- Service rooms
- Public corridors and internal corridors serving as principal routes to exits

A minimum average level of illumination of 10 lx and minimum level of illumination of 1 lx is required. An emergency power supply is required for emergency lighting so as to provide a minimum 2 hour duration following loss of normal power.

6.10.6 Exit Signs

Exit signs are required to be placed over or adjacent to every exit door within the building. Exit signs are required to be placed so as to be visible from the exit approach and are required to be internally illuminated unless directional emergency lighting is provided to illuminate reflective signs.

Exit signs are required to have the following characteristics:

- Exit signs are required to be visible from the exit approach,
- The word EXIT or the words EXIT/ SORTIE are to be displayed in plain legible letters,

- Exit signs are required to be illuminated continuously while the building is occupied and
- The lettering on exit signs is required to have a 19 mm stroke, be 114 mm high when internally illuminated or 150 mm high when externally illuminated.

An emergency power supply is required for exit lighting so as to provide a minimum 2 hour duration following loss of normal power.

It is noted that the upcoming edition of the OBC is expected to include a similar change to exit signage as included in the 2010 NBC. Exit signs are required to show a green pictogram of the “running man”, and the provision of the word “EXIT” is voluntary. See NBC Article 3.4.5.1. for further information.

6.11 Washroom Requirements

Office Washrooms 2nd through 21st Floors

The washroom requirements for the offices on the 2nd through 21st Floors are shown in Table 1 in the Appendix. The requirements are summarized as follows:

- 2nd - 6th Floors: 4 water closets each for men and women, and
- 7th - 21st Floors: 3 water closets each for men and women.

Ground Floor Washrooms

The Ground Floor washrooms will serve occupants of the public parking spaces and the Ground Floor Winter Garden and CCA Display Area. The requirements are indicated in Table 7 below. Storage area occupants are considered transitory and are accounted for elsewhere in the building.

The Ground Floor coffee shop, commercial space, and the “Friday’s Roast Beef House” seating in the Winter Garden will require washrooms to be provided within those suites to serve these occupant loads.

Table 7: Water Closet Calculations – Ground Floor Washrooms

Use	Area (m ²)	OL Factor (m ² /p)	Total Washroom Occupant Load	OBC Table	Required W/Cs	
					Men	Women
P1-P3 Parking	-	-	22 ³			
Loading Dock	140	46	3			
Total (Industrial use)			25	Industrial 3.7.4.9.	1.2	1.2
CCA Display Area	200 ⁴	3.7	54			
Seating Area at Gloucester Entrance	38	1.85	21			
Total (Assembly use)			75	Assembly 3.7.4.3.A.	0.8	1.5
Total Required					2.0	2.7
Total Provided					2	3

Washrooms for the 7th Floor Public Terrace

The 7th Floor public terrace will be provided with 3 water closets for females, 2 water closets for males, and one unisex barrier-free washroom. Based on Table 3.7.4.3.A for a general assembly occupancy the female washrooms will serve 75 persons, the male washrooms will serve 100 persons, and the unisex washroom is considered to serve 10 persons.

Since the occupant load is assumed to be a 50/50 male/female split, the terrace washrooms are adequate to serve a total terrace occupant load of 160 persons (75+75+10). The calculated occupant load of the terrace is 122 persons based on a useable area of 225 m² and a factor of 1.85 m²/person.

³ Parking level occupants are accounted for elsewhere in the building with the exception of 30 public parking spaces which represents 14% of the 212 total spaces. 14% of the parking level occupant load of 157 persons is 22 persons.

⁴ The 200 m² CCA Display Area does not include CCA reception and stairs, nor area in circulation path at entrance and elevators.

6.12 Barrier-Free Requirements

6.12.1 Areas Requiring a Barrier-Free Path of Travel

A barrier-free path of travel is required throughout the entrance storey and throughout all storeys served by a passenger elevator. A barrier-free path of travel is not required to the following areas: service rooms, elevator machine rooms, janitors' rooms, and service spaces.

The tower is served by four pedestrian entrances to the building: two from Gloucester Street, one from Elgin Street (Pocket Park), and one from Laurier Avenue. As such, Sentence 3.8.1.2. requires that at least two of these entrances be barrier-free. A barrier-free entrance required the following key features:

- One doorway to have a clear width not less than 850 mm when the door is in the open position.
- Door opening devices that do not require tight grasping or twisting of the wrist.
- Power door operators on the exterior and vestibule doors. Controls for power door operators with no face dimension less than 100 mm, mounted between 1000 mm and 1100mm from the ground.
- Vestibules are to be arranged so that that the distance between two doors in a series is a minimum of 1200 mm plus the width of any door that swings into the space in the path of travel from one door to another door.

Since the Coffee Shop and the Commercial space will be separated from, and will not have access to, the remainder of the building, at least one entrance to each suite is required to be barrier-free. The Coffee Shop entrance does not require a power door operator due to the size of the suite.

6.12.2 Protection for Floor Areas with a Barrier-Free Path of Travel

The protection for floor areas with the barrier-free path of travel from the ground to the top storey is not required as these storeys will be fully sprinklered.

6.12.3 Barrier-Free Features

Key features applicable to the barrier-free path of travel include the following:

- Every barrier-free path of travel shall provide an unobstructed width of 1100 mm for the passage of wheelchairs.
- Doors are required to have a clear width of not less than 850 mm when in the open position.
- A 1600 mm passing point is to be provided in all corridors less than 1600 mm in width and exceeding 30 metres in length.
- The maximum mounting height of all controls such as light fixtures, manual pull stations, etc. is to be a minimum of 900 mm and a maximum of 1200 mm.
- A minimum clearance of 300 mm is to be provided on the push side beside the latch of all doors in a barrier-free path of travel and a minimum clearance of 600 mm is to be provided on the pull side beside the latch of all doors in a barrier-free path of travel, unless the door is equipped with a power door operator.
- Sills greater than 13 mm in height or other floor obstructions are not permitted.
- All wall mounted fixtures and obstructions are not to project more than 100 mm into a corridor or access aisle unless located above 1980 mm or within 680 mm of the floor.
- Where vision panels are provided in doors in a barrier-free path of travel, the vision panel is to be located so that the bottom of the panel is a maximum of 900 mm above the floor.
- Doors in a barrier-free path of travel are to be designed so that they can be opened without tight grasping and twisting of the wrist.
- Vestibules in a barrier-free path of travel are to be arranged so that that the distance between two doors in a series is a minimum of 1200 mm plus the width of any door that swings into the space in the path of travel from one door to another door.

The ramp at the west side of the Winter Garden is to be designed to meet Article 3.8.3.4. with a maximum gradient of 1:12 (8.33%), handrails on both sides, and minimum width of 900 mm between handrails.

6.12.4 Barrier-Free Washrooms and Showers

Washrooms are required to be barrier-free unless a barrier-free washroom is provided on the same floor level within 45 metres. This requirement can be satisfied by providing a barrier-free stall designed to meet Article 3.8.3.8. in the men's and women's washrooms, or, by

providing a unisex Universal Toilet Room designed to meet Article 3.8.3.12.

If the Coffee Shop is completely separated from, and without access to, the remainder of the building, then the washrooms in this suite will not be required to be barrier-free since the suite is less than 300 m² in area.

Barrier-free washrooms will be required within the commercial space.

If showers are provided in the building then at least one shower stall in each group of showers is required to be designed to the barrier-free requirements in Article 3.8.3.13.

6.12.5 Barrier-Free Design of Elevators

Passenger elevators are required to conform to the barrier-free design requirements in Appendix E of CSA B44 “Safety Code for Elevators”.

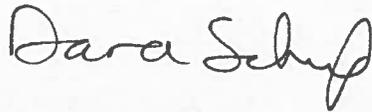
As per Article 3.5.4.1., at least one passenger elevator serving all storeys is required to have inside dimensions and door dimensions and configurations such that the elevator will accommodate a patient stretcher 2010 mm long and 610 mm wide in the prone position. The door width and configuration must allow two attendants to manouvre the stretcher while maintaining the stretcher in a prone position.

6.13 Green Roof Design

The design of a green roof is not explicitly addressed by the OBC. A building that is required to be noncombustible, such as the tower, is permitted to have a combustible roof covering with an A, B, or C classification as per Article 3.1.5.3. This can be provided under the vegetation and drainage components. It is recommended that the design of the green roof follow the Toronto Green Roof Standard, specifically Section 429-9 of the Standard that includes provisions for structural loading, drainage, fire safety, and vegetation performance.

END OF REPORT

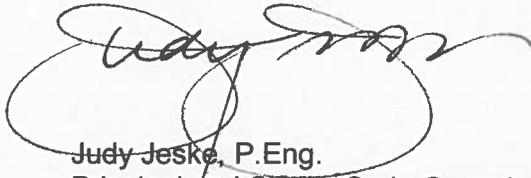
Morrison Hershfield Limited



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Table 1: 150 Elgin - Occupant Load and Office Washroom Requirements - February 6, 2012 by Morrison Hershfield Limited

Occupant Loads					Washroom Requirements									
Storey	Use	Area (m ²)	Factor	Occupant Load	OL for WC Calcs ⁵	Req'd No. of Men's WC (or equiv)	Actual Men's WC	Req'd No. of Women's WC	Actual Women's WC					
3rd Parking Level	Storage ¹	113	46	2	See Washroom Calculations (Table 7) in Section 6.11 of Report									
	Parking Area	2501	46	54										
3rd Parking Level Total Occupant Load:				57										
2nd Parking Level	Storage	113	46	2										
	Parking Area	2501	46	54										
2nd Parking Level Total Occupant Load:				57										
1st Parking Level	Storage	161	46	4										
	Parking Area	2260	46	49										
1st Parking Level Total Occupant Load:				53										
Ground Floor	Storage (Including Office Storage)	267	46	6										
	Loading Dock	140	54	3										
	CCA Display Area	200	3.7	54										
	Seating Area	38	1.85	21										
	Friday's Roast Beef House Seating ²	65	1.1	59										
	Coffee Shop ²	146	1.1	133										
	Commercial Space ²	720	3.7	195										
Ground Floor Total Occupant Load:				469										
Second Floor	Office	2100	9.3	226						150	4.0	4	4.0	4
	Terrace ³	163	1.85	88						-				
2nd Floor Total Occupant Load:				314						150				
Third Floor	Office	2100	9.3	226						150				
	Terrace ³	25	1.85	14						-				
3rd Floor Total Occupant Load:				239	150									
Fourth Floor	Office	1876	9.3	202	134									
	Terrace ³	152	1.85	82	-									
4th Floor Total Occupant Load:				284	134	3.7	4	3.7	4					
Fifth to Sixth Floors	Office	1876	9.3	202	134	3.7	4	3.7	4					
5th - 6th Floors Total Occupant Load (for each level):				202	134									
Seventh Floor	Office	1280	9.3	138	91	2.8	4	2.8	3					
	Public Terrace ⁴	225	1.85	122	-									
7th Floor Total Occupant Load:				259	91									
Eighth to Seventeenth Floors	Office	1280	9.3	138	91	2.8	4	2.8	3					
8th - 17th Floors Total Occupant Load (for each level):				138	91									
Eighteenth Floor	Office	1053	9.3	113	75	2.5	4	2.5	3					
	Terrace ³	214	1.85	116	-									
18th Floor Total Occupant Load:				229	75									
Nineteenth to Twentieth Floors	Office	1053	9.3	113	75	2.5	4	2.5	3					
19th - 20th Floors Total Occupant Load (for each level):				113	75									
Twenty-First Floor	Office	863	9.3	93	62	2.2	4	2.2	3					
21st Floor Total Occupant Load:				93	62									
Twenty-Second to Twenty-Third Floors	Mechanical Penthouse													
22nd - 23rd Floors Total Occupant Load:				0										

¹ For all storage areas occupants are accounted for in other areas of the floor/building for washroom calculations.

² Washrooms will be provided within these individual suites.

³ Terrace occupants are accounted for in other areas of the floor/building for washroom calculations.

⁴ Public terrace area of 562 m² will be approximately 60% planters and furnishings so area for occupants is 225 m². Public Terrace Washrooms provided separately, see Section 6.11 of report for details.

⁵ In a Group D occupancy the washroom occupant load is based on 14 m²/person as per Sentence 3.7.4.2.(1).