

**WASTE DIVERSION ONTARIO
Continuous Improvement Fund**

**ONTARIO BUILDING CODE
PROPOSED CHANGES
October 30, 2012**

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CIF Project 219

Table of Contents

Table of Contents

1.	INTRODUCTION.....	1
2.	SCOPE OF WORK.....	1
3.	PROJECT TEAM.....	1
4.	REFERENCE MATERIALS.....	2
5.	LIMITATIONS.....	2
6.	ONTARIO BUILDING CODE PROPOSED CHANGES.....	3
6.1	Background.....	3
6.2	Discussion - Current OBC Provisions.....	4
6.2.1	Review of Article 3.6.3.3. Pertaining to Refuse Chutes.....	4
6.2.2	Clause 3.6.3.3.(5)(a).....	5
6.2.3	Clause 3.6.3.3.(5)(c).....	5
6.2.4	Clause 3.6.3.3.(5)(d).....	6
6.3	Discussion - Suggested New OBC Provisions.....	7
6.3.1	Multiple Chutes.....	7
6.3.2	Recycling Rooms.....	7
6.3.3	Recycling "As Convenient".....	7
6.3.4	Summary of Recommended Changes/New Provisions.....	8
7.	OBC DIVISION A, PART 2 – OBJECTIVES.....	8
8.	COST/BENEFIT ANALYSIS.....	9
9.	ENFORCEMENT.....	9

APPENDICES

Appendix A – Toronto Green Standard and City of Toronto Requirements

Appendix B – Ontario Building Code References

List of Tables

Table 3-1	Project Team.....	1
Table 4-1	Reference Materials.....	2

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1. Introduction

Waste Diversion Ontario under the Continuous Improvement Fund (CIF) Project #219 retained GENIVAR Inc. to review the 2006 Ontario Building Code and determine which provisions on the Code should be changed to implement standards for the storage and collection of blue box recyclables in new multi-unit residential buildings. Although the emphasis of this report is on new construction some of the recommendation could be applicable to existing buildings.

This is Part 3 of our mandate. Part 1 included the review of the municipal multi-residential building design requirements. A “Best Practices” Guide for the storage and collection of recyclables in multi-residential buildings was submitted. Part 2 included a review of current Canadian LEED Green Buildings Rating System applicable to recycling in multi-unit residential buildings. The recommendations of Part 1 and Part 2 form the basis for this report.

Both Part 1 and Part 2 of our review concluded buildings are constructed without optimum facilities to maximize waste diversion. One of the main difficulties in multi-family buildings was the lack of space on every floor and/or in a centralized location within the building.

2. Scope of Work

In accordance with the RFP the scope of work for this investigation included the following:

- Assess the 2006 OBC and determine which provisions should be changed to support the storage and collection of blue box recyclables in new multi-unit buildings.
- Recommend the new provisions that should be implemented in the OBC based on the recommendations of Part 1 report.
- The proposed OBC changes are of general application and do not deal with specific products or situations.
- Determine which of the objectives do the changes address Part 2 of the OBC Division A.
- Cost/Benefit Analysis of the benefits of implementing the OBC changes.
- Determine if the requested OBC change(s) can be enforced by the existing infrastructure or additional resources will be required.
- Complete and fill out the 2006 OBC Change Request Form including supporting documentation.

The review of the provisions of the 2007 Ontario Fire Code is outside the scope of work of this project.

3. Project Team

The following individuals comprise the investigation team for this study:

Table 3-1 Project Team

Patricia Paz-Soldan, P. Eng., LEED AP.	GENIVAR Inc.
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Patricia Paz-Soldan prepared and reviewed the report.

Additional review was provided by Nate Simpson, C.E.T., GENIVAR Inc.

4. Reference Materials

The following reference materials were provided for use or have been utilized in the preparation of this investigation:

Table 4-1 Reference Materials

Mayor's Tower Renewal - Pilot Feasibility Study – GENIVAR Inc. – March 30, 2010.

Best Practices-Storage & Collection of Recyclables in MURB –GENIVAR Inc. - February 28, 2011

Leed Certification Report – GENIVAR Inc. – February 9, 2012

2006 Ontario Building Code, O. Reg. 350/06

5. Limitations

The information contained in this report represents the professional opinion of GENIVAR Inc. (the Consultant) and their best judgement under the natural limitations imposed by the Scope of Work.

This report is intended solely for the Client named. The material in this report reflects the Consultant's best judgement in light of the information available to it at the time of preparation.

Any use a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. The Consultant accepts no responsibility for damages, if any suffered by any third party as a result of decisions made or actions based on this report.

Do not use any part of this report as a separate entity. The report has been written to be read in its entirety and for the exclusive use of the Client named.

All files, notes, source data, test results and master files are retained in the offices of GENIVAR Inc. and remain the property of the Consultant.

6. Ontario Building Code Proposed Changes

6.1 Background

During our building review and data analysis in Part 1, we identified the systems that appear to provide a higher rate of diversion as follows:

- a) Dual and potentially triple chute systems,
- b) Single chute with large chute intake rooms for floor to floor recycling. This option was one of the Waste Diversion Strategies recommended in the GENIVAR's Waste Diversion study with the Mayor's Tower Renewal Pilot project.
- c) Single chute system with a tri-sorter and lockable doors; the lockable doors appear to decrease the level of contamination,
- d) No chute collection system or closing the chute for existing buildings, no compactor and in their place provide combined garbage and recycling room.
- e) Measures a) to c) must include a separate recycling room that accommodates larger bins for collection of cardboard and other materials.

Under Part 2 of our mandate we recommended that new buildings being certified under LEED NC, could adapt or implement the following measures:

- a) Triple or Higher Disposal Chute Systems
- b) Dual Chute Systems
- c) Single chute with large chute intake rooms for floor to floor recycling. This option was one of the Waste Diversion Strategies recommended in the GENIVAR's Waste Diversion study with the Mayor's Tower Renewal Pilot project.
- d) For option a) and b) a separate recycling room is recommended.

In summary, the following are the general recommended measures:

- 1) Multiple chutes for dedicated recycling streams; or
- 2) Larger chute intake rooms that allow floor-to-floor recycling and
- 3) A separate recycling room that can accommodate larger bins, cardboard and other recyclable materials.

It should be noted that the requirement for additional chutes and dedicated recycling rooms is one of the recommendations included in the Toronto's Green Standard (TGS) for Mid to High-Rise Developments for the Storage and Collection of Recycling and Organic Waste and most recently in the City of Toronto, May 2012 Requirements for Garbage, Recycling and Organics collection services for New Developments and Re-developments.

Relevant pages of the TGS and City of Toronto requirements are included in Appendix A.

6.2 Discussion - Current OBC Provisions

Application of the Ontario Building Code

The Ontario Building Code (OBC) is a regulation made under the Building Code Act. The OBC is applicable to construction of new buildings, renovation of existing buildings, changes of use within existing buildings and renovations that result in an increase in hazard, as determined by the applicable provisions.

The OBC provisions included in the scope of this report are those of Division B, Part 3 “Fire Protection, Occupant Safety and Accessibility”. References (e.g. Article, Sentence, Clause) note requirements of the OBC unless otherwise identified.

OBC Provisions Pertaining to Refuse Storage and Collection within Residential Buildings

The use of the word ‘refuse’ in this OBC provision does not exclude recyclables; however, it is a common perception that refuse is taken to mean only non-recyclables. For the purposes of this report refuse will mean both recyclables and non-recyclables, except where specific mention of ‘recyclables’ is warranted.

There are several provisions that regulate the construction of facilities for disposal of refuse, where such facilities are provided within buildings. As set out in the foregoing sections of the report the buildings considered as part of the project scope are those containing multi-unit, Group E (Residential) occupancies.

The following are the principal provisions of Part 3 that pertain to or impact requirements for refuse facilities in residential occupancies.

1. Article 3.3.1.4. pertaining to fire separation of public corridors,
2. Sentence 3.3.4.2.(1) pertaining to fire separation between suites of residential occupancy and adjoining suites and the remainder of the building, and
3. Article 3.6.3.3., which sets out fire separation requirements amongst other design criteria.

For the purposes of this report the focus of the following sections will be on the requirements of Article 3.6.3.3. The other provisions as noted above will be referenced as necessary (e.g. in the case where they contain requirements that modify or supersede the provisions of Article 3.6.3.3.).

6.2.1 Review of Article 3.6.3.3. Pertaining to Refuse Chutes

The requirements for refuse chutes are found in Article 3.6.3.3. This Article includes requirements for both linen and refuse chutes governing provisions regarding material properties, fire-resistance ratings for shafts and enclosures, minimum room size requirements, extension of the shaft enclosure above the roof, etc.

The focus of the review of the requirements pertaining to refuse chutes is on the provisions of Sentence 3.6.3.3.(5). This Sentence pertains to the intake rooms, which are commonly provided on each storey of buildings containing a refuse chute. The other provisions of Article 3.6.3.3. will be referenced only as necessary (e.g. in the case where they contain requirements that modify or supersede the provisions of Sentence 3.6.3.3.(5).)

The following summary is of the provisions of Sentence 3.6.3.3.(5) applicable to refuse chute intake rooms. Specifically, refuse chute intake rooms:

1. Must have no dimensions less than 750mm [Clause 3.6.3.3.(5)(a)],
2. Be separated from the remainder of the building by a fire separation having a fire-resistance rating of at least $\frac{3}{4}$ hr [Clause 3.6.3.3.(5)(b)]*,
3. Must be designed for no other purpose [Clause 3.6.3.3(5)(c)], and
4. Must not open directly into an exit [Clause 3.6.3.3 (5)(d)].

(*) Except that higher fire-resistance ratings (e.g. 1 hr, 2 hr) may be required by other provisions of the OBC depending on the uses adjacent/adjoining the intake room; for example Sentence 3.3.4.2.(1) if adjoining a residential suite, or 2 hr if adjacent to an exit enclosure in a building requiring such enclosures to have a 2 hr fire-resistance rating.

A copy of these OBC Articles is included in Appendix B.

The following sections of this report include a further review of the noted provisions of Sentence 3.6.3.3.(5) as it pertains to opportunities for the development of proposed changes to the OBC. Specifically, this includes the provisions of Clause 3.6.3.3.(5)(a), Clause 3.6.3.3.(5)(c) and Clause 3.6.3.3.(5)(d).

6.2.2 Clause 3.6.3.3.(5)(a)

The 750mm minimum required dimension does not allow sufficient space to include any recycling container(s) to be stored in the refuse chute intake room. Most builders/developers size the refuse chute rooms to comply with the minimum sizes specified in the OBC.

New Buildings

Increasing the minimum size of this room may encourage residents to recycle other types of materials depending on the number of chutes and/or type of internal collection systems. The current minimum size is too small to permit any floor to floor collection. This type of collection has a higher rate of diversion and is recommended in our February 28, 2011 study to support recycling in multi residential buildings as well as the Mayor's Tower Renewal study. Current codes do not permit any additional storage within the intake rooms, as discussed in Item 6.2.3 below. Additional provisions may be recommended to offset the risk associated with the larger intake rooms that may result as an outcome of an increased intake room (i.e. for facilitating floor to floor collection).

6.2.3 Clause 3.6.3.3.(5)(c)

This Clause prohibits the storage of any refuse (i.e. "green"/organics, "blue"/recyclables, or other household waste) within the chute intake room. However, another provision in the OBC would permit the storage of refuse in a separate room, one which is not connected to a refuse chute. Specifically, Sentence 3.6.2.5.(1) permits the storage of combustible refuse in special storage rooms that satisfy 2 required conditions:

- Clause 3.6.2.5.(1)(a) -The room must be separated from the building by a fire separation with a fire-resistance rating not less than 1h, and
- Clause 3.6.2.5.(1)(b) –The room must be sprinklered.

New Buildings

The construction of a separate enclosure adjacent to the refuse chute room was considered in our February 28, 2011 study, and it would be feasible for new construction.

However, the additional area required would reduce the saleable area of a building and increase the overall cost of the project.

If this Clause is modified in a manner that would permit the storage of recyclables without the need to build a separate enclosure it would reduce the construction costs associated with the construction of a separated refuse storage room in new developments.

We understand if the existing provisions of the OBC were revised to permit chute rooms to be used also as a storage location for recyclable materials; it would likely involve the requirement to provide enhanced protection to offset the risks. For example, it could be that such intake rooms, with a 'storage' component/use, would have to meet the same requirements of Sentence 3.6.2.5.(1) for increased fire separation fire-resistance ratings and sprinkler protection.

However, as most buildings over three storeys in building height containing residential occupancies are required by the current OBC to be fully sprinklered, any additional provisions to permit storage use in intake rooms may necessitate greater fire-resistance ratings (i.e. 1.5 hr or 2 hr) and/or additional fire detection devices to offset the increased risk.

Additional measures beyond those of increased ratings and increased detection/suppression may also be warranted in consideration of any potential permission for storage use in intake rooms. Such consideration may include, for example, mandatory use of fire-safe containers and out-references from the OBC to the Ontario Fire Code in regards to the mandatory requirement for Fire Safety Planning measures regulating the supervision and collection of recyclables from the intake rooms.

Please refer to Section 8 for an estimation of the additional costs.

Existing Buildings

For existing buildings these provisions set the baseline in regards to the restrictions in the use of the chute intake rooms prohibiting their use in storing recyclables. Renovation of existing buildings requires the application of current OBC requirements; therefore, the provisions and considerations as discussed above are applicable in such cases.

Existing buildings, or portions thereof, not otherwise undergoing renovation are subject to the requirements of the Ontario Fire Code (OFC) regulation in force at the time. Although the review of OFC requirements pertaining to the subject matter at hand is not within the scope of this project, their mention is warranted in this section. Specifically, the OFC prohibits the use of a building, or portion thereof, for any other purpose than for which it was designed. Use of the chute intake rooms for any storage use is prohibited by the OFC unless approval has been given by the Authority Having Jurisdiction (i.e. Fire Department).

Presently, such obtaining Fire Department approval would have to be done on a jurisdiction-by-jurisdiction basis, since there is no uniform approval for this particular circumstance throughout the Province. Negotiations for and approvals of such use would likely involve some of the same considerations as those described in the foregoing section of this report (e.g. increased fire-resistance ratings, detection/suppression devices use of fire-safe containers).

6.2.4 Clause 3.6.3.3.(5)(d)

Most of the refuse chute room doors currently open inwards, decreasing even further the usable floor area; we understand in order to meet this article. However, the doors could open into corridors serving residents' suites or spaces other than an exit. There is one consideration relating to the minimum corridor width, the outward swing door should not encroach into the required 1100mm minimum width of the corridor. Doors are already mandated to be provided with self-closing devices and positive latching hardware. Clarification can be provided that these doors could open "outwards" as long as do not open directly into a fire exit and do not encroach into the minimum corridor width.

New Buildings

For new buildings the option to swing the chute room doors outwards will reduce the size of the refuse chute rooms and reduce the overall project costs. The corridor size would have to be already sufficiently wide to accommodate the door swing. It is not the intent of this item to increase the corridor size to accommodate the door swing.

Existing Buildings

Existing buildings with the minimum size refuse chute rooms have no possibility of increasing recycling unless the chute doors are retrofitted to open "outwards" then a container could be placed on the floor. Existing buildings could retrofit the door swing and be able to have space for the installation of on-floor recycling. The minimum corridor width would need to be met, which may require modification of its configuration. Additionally, the risk of introducing a storage use within the existing chute intake room would likely only be approved by Authority Having Jurisdiction (i.e. Building Department and Fire

Department) with sufficient compensatory measures (e.g. installation of sprinklers in the room, installation of detection devices, limits on quantity of storage, modification of the buildings' Fire Safety Plan to include procedures for collection of materials).

6.3 Discussion - Suggested New OBC Provisions

6.3.1 Multiple Chutes

There are no provisions in the OBC that discuss multiple chutes. The minimum room dimension does not encourage any infrastructure size increase to consider 2 and/or 3 dedicated recycling streams with adaptability for other materials.

We recommend adding a provision in the appropriate Part of the OBC (e.g. Part 12 "Resource Conservation") that for new developments involving buildings greater than 4 storeys in building height, the installation of an internal collection system should allow for:

- a) Multiple, separate recycling chute(s) to handle individual streams of refuse/recyclables, or
- b) Enlarged chute intake rooms for floor-to-floor recycling.

6.3.2 Recycling Rooms

There are no provisions in the OBC that mandate the provision of a recycling room.

We recommend adding a provision in the appropriate Part of the OBC (e.g. Part 12 "Resource Conservation") that for new developments the installation of a recycling room in a centrally located area is mandatory, should a multiple-chute diversion facilities not be provided. Additional text/provisions should be included as warranted to allow for this dedicated area to be located within or attached to the building.

The proposed area of the recycling room can follow the recommendations of our Best Practices report dated February 28, 2011. Recommended areas vary depending whether front-end bins or carts are used.

Recycling rooms should provide a minimum floor space for bins of 10m² for the first 40 units plus an additional 5m² for each additional 60 units.

Building Size	Minimum Size of Recycling Room Front-end Bins	Minimum Size of Recycling Room Carts
up to 40 units	10 sq m	4.2-6.3 sq m
41-100 units	15 sq m	4.2- 14.7 sq m
101-160 units	20 sq m	14.7-24 sq m
161-220 units	25 sq m	
221-280 units	30 sq m	
281-340 units	40 sq m	

6.3.3 Recycling "As Convenient"

If recycling is to be "as convenient" as garbage disposal this statement should be included in the appropriate Part of the OBC (i.e. Part 12 "Resource Conservation").

6.3.4 Summary of Recommended Changes/New Provisions

The following changes and new provisions are recommended for consideration and proposal to the Ministry of Municipal Affairs and Housing:

- a) The installation of separate recycling chute(s) is required unless the chute intake room is of sufficient size to permit floor-to floor recycling, with appropriate counter-measures to address the increased risk associated with storage of recyclables within the room.
- b) Recycling is permitted to be stored within chute intake rooms. The chute intake rooms must be equipped with appropriate counter-measures to address the increased risk associated with the storage of recyclables within the room.
- c) Chute intake room doors could swing outward but not into a fire exit and without encroaching into the minimum corridor width of 1100mm.
- d) A separate recycling room should be provided with sufficient room for the storage of different streams of recyclables.
- e) Recycling facilities should be “as convenient” as garbage disposal facilities.

We suggest that these changes and provisions be included in OBC Part 12 “Resource Conservation” as a new category “Waste Diversion Efficiency”.

7. OBC Division A, Part 2 – Objectives

Part 2 of the OBC lists the general objectives that are covered in the Building Code. The objectives relate to safety, health, accessibility, fire, structural, water and sewage protection of buildings and resource conservation.

The changes proposed in this report will improve recycling rates and help the conservation of resources, Category Resource Conservation (“OR”) in OBC Division A, Part 2, Table 2.2.1.1.

It has been long understood that recycling reduces the usage of natural resources that ultimately can be depleted. The rapid growth of the world’s population is straining the sustainable use of the Earth’s natural resources due to the use of natural products and materials such as paper, metals, glass, etc. An appropriate application and use of natural products, supported by the reuse and recycling of these materials is necessary for the preservation of the Earth’s resources.

The Resource Conservation category has 2 sub-categories:

OR1 – Water Conservation

OR2 – Energy Conservation

Alternatively, a new objective could be introduced that identifies *Waste Diversion Efficiency* as one of the Resource Conservation objectives to limit/reduce the amount of waste generated by the usage of the building.

If a new Waste Diversion objective is created it would require the introduction of a new Functional Statement to be included in OBC Division A, Part 3 , Table 3.2.1.1. For example, the new statement could be identified as “F132 – To reduce waste disposal rates in buildings.”

8. Cost/Benefit Analysis

The implementation of these changes may result in additional costs for new construction. The provision of additional measures in support of recycling efforts (e.g. installation of additional chutes or larger refuse chute rooms, measures to permit storage within chute intake rooms and the installation of a recycling room) will likely increase baseline construction costs. However, the benefit of increasing garbage diversion rates is that it decreases the cost associated with waste disposal and landfill costs, which could counteract the previously noted potential baseline construction cost increases.

The following chart presents an estimation of additional cost for the recommended measures presented in a square meter basis x building size. The square meter cost of new construction has been estimated at \$1,600/m².

Building Size	Recycling Room		Increase in Chute Intake Room – Size (Based on 0.80m ² /floor)	Increase in Chute Room - Fire Separation Costs & Fire Detection	Additional Chute Costs
	Area (m ²)	Cost	Cost	Cost	Cost
up to 40 units	10	\$16,000	\$5,000	\$10,000	\$5,000
41-100 units	15	\$24,000	\$10,500	\$20,000	\$10,000
101-160 units	20	\$32,000	\$17,000	\$30,000	\$15,000
161-220 units	25	\$40,000	\$23,500	\$42,000	\$22,000
221-280 units	30	\$48,000	\$30,000	\$52,000	\$28,000
281-340 units	40	\$64,000	\$36,500	\$65,000	\$35,000

9. Enforcement

The recommended changes/new provisions to the OBC, should they be accepted, would be administered under existing regulatory approval structures (e.g. as part of the permit drawing review by a plans examiner of the municipality's Building Department). It is anticipated that additional/new resources would not be required as a result of the incorporation of any of the proposed changes becoming part of the OBC regulation.

Similarly, it is anticipated that additional/new resources would not be required for the introduction of proposed changes to existing buildings, which are governed by the Ontario Fire Code, under existing regulatory approval structures. The requirements for the provision of Fire Safety Plans, maintenance of existing fire and life safety systems and the control and removal of fire hazards from within and around buildings are already in place within the existing OFC. Modification of these measures appropriate to the respective conditions of a subject building would be necessary; however, this would not induce, in our opinion, the requirement for additional enforcement resources.

APPENDIX A

TGS and City of Toronto Requirements

**CITY OF TORONTO REQUIREMENTS
FOR GARBAGE, RECYCLING AND
ORGANICS COLLECTION SERVICES
FOR NEW DEVELOPMENTS
AND REDEVELOPMENTS**

LAST REVISED: MAY 2012

Diversion Program Requirements

It is the responsibility of the Developer and Property Manager to ensure that the waste diversion program be AS CONVENIENT to each resident in the development as the garbage collection program.

Waste Diversion Methods:

It is the responsibility of the Developer and Property Manager to provide and maintain a waste diversion system using one of the following methods subject to the approval by the General Manager:

- i) No chute provided that there is a central waste collection and waste diversion facility on the ground floor and subject to the approval by the General Manager;**
- ii) Single chute with a tri-sorter;**
- iii) Two separate chutes with one of the chutes equipped with a dual sorter; or**
- iv) Three separate chutes.**

NOTE: All applicable building and fire codes and all other applicable legislation must be adhered to with regards to the residential drop off point.

The building is required to be designed in a manner that prohibits access to any waste storage room(s) equipped with a compactor(s) for the safety of the residents and the general public.

Bin Collection & Storage Requirements

Multiple household bin collection service is typically established at buildings with less than 31 units and/or townhouse complexes, unless otherwise approved by the General Manager. The multiple household bin collection system uses 95 gallon containers compatible with City vehicles for the collection of garbage and recyclable materials.

Bins

- The multiple household bin(s) must be obtained from the City of Toronto.
- An onsite staff/maintenance person is required to move the bins from the garbage/recycling/organics storage room to the collection point which will be curbside.
- All billing matters related to the City of Toronto solid waste collection services are the responsibility of the Condominium Corporation/Property Management.

Toronto Green Standard

Making a Sustainable City Happen



For

Mid to HighRise Development

(All buildings 4-stories or greater, and
all residential apartment buildings)



toronto at your service

Livegreen
Toronto

SOLID WASTE

For New Mid to High-Rise Residential and Industrial, Commercial and Institutional (ICI) Development



Development Feature	Required Tier 1	Voluntary Tier 2	Specifications, Definitions and Resources	Potential Strategies
<p>Storage and Collection of Recycling and Organic Waste</p> <p>Facilitate waste reduction and efficient processing</p>	<p>SW 1.1 Provide a dedicated area or areas within or attached to the building for the collection and storage of recycling and organic waste.¹</p> <p>SW 1.2 If a separate recycling room is required, provide a recycling room with an area of at least 10m² for the first 40 residential units and 5m² for each additional 40 residential units in the building.</p>	<p>SW 1.3 For residential buildings, provide recycling containers with the capacity of 8 cubic yards per 100 residential units per week.</p>	<p>1. Dedicated areas are within a short walking distance of users and are equally as convenient as garbage storage areas. Provide well-lit access to storage areas.</p>	<p>Three chute system</p>
<p>Reuse of Building Materials</p> <p>Reduce demand for new materials and reduce waste going to landfill</p>		<p>SW 2.1 Ensure that at least 5% of a project's materials (based on value) comprise salvaged, refurbished or reused materials.</p>	<ul style="list-style-type: none"> Material costs exclude installation expenses (e.g. labour and equipment) and transportation costs. This target may be met through the reuse of various building components, including but not limited to, structural steel, timbers, a building facade and/or existing concrete structures. Materials must also satisfy the requirements of the Ontario Building Code, or any other Applicable Standard (such as CSA certification), as well as the requirements of TARION Home Warranty Program. 	<p>Integrate existing structures into site design</p> <p>Salvaged beams, posts, flooring, paneling, doors, frames, cabinetry, furniture, bricks and detailing</p> <p>Reuse trees removed from the site as timber for terracing and erosion control</p>

APPENDIX B

Current OBC Articles

- (4) A vent from a *vertical service space* not extending to the roof shall be enclosed within the *building* with construction having a *fire-resistance rating* not less than that required for the *vertical service space* walls.
- (5) Only openings that are necessary for the use of the *vertical service space* shall be permitted through a *vertical service space* enclosure.

3.6.3.2. Foamed Plastic Protection

- (1) Foamed plastic insulation in a *vertical service space* shall be protected in conformance with Article 3.1.5.12.

3.6.3.3. Linen and Refuse Chutes

- (1) A linen chute or refuse chute shall,
- be impervious to moisture,
 - have a smooth internal surface,
 - be corrosion-resistant,
 - be constructed of *noncombustible* material, and
 - be located in a shaft in which there are no services other than *noncombustible* drain, waste and vent piping or *noncombustible* water piping.
- (2) A shaft containing a linen chute or refuse chute shall have a *fire-resistance rating* conforming to Sentence 3.6.3.1.(1), but not less than,
- 1 h if the chute outlet for the discharge room is protected by an automatic, self-latching *closure* held open by a fusible link, or
 - 2 h if no *closure* is provided at the chute outlet into the discharge room.
- (3) An interior linen chute or refuse chute shall extend not less than 1 000 mm above the roof and shall be vented above the roof with a vent that,
- has an unobstructed area not less than the cross-sectional area of the chute, and
 - is equipped with a cover that will open automatically, or that can be opened manually, in the event of a fire in the chute.
- (4) Intake openings for a linen chute or a refuse chute shall,
- have an area not more than 60% of the cross-sectional area of the chute, and
 - be fitted with *closures* designed to close automatically and latch after use.
- (5) Intake openings for a linen chute or a refuse chute shall be located in rooms or compartments that,
- have no dimension less than 750 mm,
 - are separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than 45 min,
 - are designed for no other purpose, and
 - do not open directly into an *exit*.
- (6) Sprinklers shall be installed at the top of each linen chute or refuse chute, at alternate floor levels and in the room or bin into which the chute discharges.
- (7) The room into which a linen chute discharges shall be separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than 1 h.
- (8) A refuse chute shall be equipped at the top with spray equipment for washing-down purposes.
- (9) A refuse chute shall discharge only into a room or bin separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than 2 h.

(10) The room or bin into which a refuse chute discharges shall be of sufficient size to contain the refuse between normal intervals of emptying, be impervious to moisture and be equipped with a water connection and floor drain for washing-down purposes.

(11) A room into which a refuse chute discharges shall contain no service equipment that is not related to refuse handling and disposal.

3.6.3.4. Exhaust Duct Negative Pressure

(1) If a *vertical service space* contains an *exhaust duct* that serves more than one *fire compartment*, the duct shall have a fan located at or near the exhaust outlet to ensure that the duct is under negative pressure.

3.6.4. Horizontal Service Spaces and Service Facilities

3.6.4.1. Scope

(1) This Subsection applies to *horizontal service spaces* and service facilities, including ceiling spaces, duct spaces, crawl spaces and *attic or roof spaces*.

3.6.4.2. Fire Separations for Horizontal Service Spaces

(1) A *horizontal service space* that penetrates a required *vertical fire separation* shall be separated from the remainder of the *building* it serves in conformance with Sentence (2).

(2) If a *horizontal service space* or other concealed space is located above a required *vertical fire separation* other than a vertical shaft, this space need not be divided at the *fire separation* as required by Article 3.1.8.3. provided the construction between this space and the space below is a *fire separation* with a *fire-resistance rating* equivalent to that required for the *vertical fire separation*, except that the *fire-resistance rating* is permitted to be not less than 30 min if the *vertical fire separation* is not required to have a *fire-resistance rating* more than 45 min. (See Appendix A.)

3.6.4.3. Plenum Requirements

(1) A concealed space used as a *plenum* within a floor assembly or within a roof assembly need not conform to Sentence 3.1.5.15.(1) and Article 6.2.3.2. provided,

- (a) all materials within the concealed space have a *flame-spread rating* not more than 25 and a smoke developed classification not more than 50, except for,
- (i) tubing for pneumatic controls,
 - (ii) optical fibre cables and electrical wires and cables that exhibit a flame spread not more than 1.5 m, a smoke density not more than 0.5 at peak optical density and a smoke density not more than 0.15 at average optical density when tested in conformance with the Flame and Smoke Test in the Appendix to CAN/CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables" (FT6 Rating),
 - (iii) optical fibre cables and electrical wires and cables that are located in totally enclosed *noncombustible* raceways,
 - (iv) totally enclosed nonmetallic raceways that exhibit a horizontal flame distance of not more than 1.5 m, an average optical smoke density of not more than 0.15, and a peak optical smoke density of not more than 0.5 when tested in conformance with the Test for Flame Propagation and Smoke Density Values in Section 3.3 of the ULC/ORD -C2024, "Fire Tests for Optical Fibre Cable Raceway" (FT-6 Rating), and
 - (v) single conductor electrical wires and cables that exhibit a vertical char of not more than 1.5 m when tested in conformance with the Vertical Flame Test - Cables in Cabletrough in Clause 4.11.4. of CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables" (FT4 Rating), and
- (b) the supports for the ceiling membrane are of *noncombustible* material having a melting point not below 760°C.

(7) Except as permitted by Sentence (8), in a *storey* that is not *sprinklered*, a *service room* that contains service equipment other than that addressed by Sentences (1) to (6), shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

(8) If a *service room* referred to in Sentence (7) contains a limited quantity of service equipment, and the service equipment neither constitutes a fire hazard nor is essential to the operation of fire safety systems in the *building*, the requirements for a *fire separation* shall not apply.

(9) A *fire separation* is not required between a fireplace and the space it serves.

(10) A *fire separation* is not required between a roof-top *appliance* and the *building* it serves.

(11) The *fire separation* provisions for a fuel-fired *appliance* in a portable classroom shall conform to Article 3.9.3.7.

3.6.2.2. Service Rooms under Exits

(1) A *service room* containing service equipment subject to possible explosion, such as *boilers* operating in excess of 100 kPa (gauge) and some types of refrigerating machinery and transformers, shall not be located directly under a required *exit*.

3.6.2.3. Service Equipment

(1) A *service room* containing space heating, space cooling and service water heating *appliances* is permitted to contain other service equipment such as electrical service equipment.

3.6.2.4. Incinerator Rooms

(1) A *service room* containing an incinerator shall not contain other fuel-fired *appliances*.

3.6.2.5. Combustible Refuse Storage (See Appendix A.)

(1) Except as required by Sentence 3.6.3.3.(9), a room for the storage of *combustible* refuse shall be,
(a) separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than 1 h, and
(b) *sprinklered*.

3.6.2.6. Door Swing for Service Rooms

(1) A swing-type door from a *service room* containing a *boiler* or incinerator shall swing outward from the room, except that the door shall swing inward if the door opens onto a corridor or any room used for an *assembly occupancy*.

3.6.2.7. Electrical Equipment Vaults

(1) Where an electrical equipment vault is required by a regulation made under the *Electricity Act, 1998*, the electrical equipment vault shall be totally enclosed by a *fire separation* of solid masonry or concrete construction having a *fire-resistance rating* of not less than 3 h if the vault is not provided with an automatic fire extinguishing system and not less than 2 h if the vault is so protected.

(2) Where a *building* is required to be *sprinklered*, the electrical equipment vault described in Sentence (1) need not be *sprinklered* provided,

(a) the vault is designed for no purpose other than to contain the electrical equipment, and

- a 1 134 kg elevator car with minimum interior dimensions of 2 032 mm wide and 1 295 mm deep with a right or left hand access door. The minimum access door width is 1 067 mm and it must be on the 2 032 mm side of the car.
- a 1 134 kg elevator car with minimum interior dimensions of 2 032 mm deep and 1 295 mm wide with a minimum 915 mm wide access door located on the 1 295 mm side.

A-3.6.2.1.(1) Location of Fuel-Fired Appliances.

Sentence 3.6.2.1.(1) requires that fuel-fired appliances be located in service rooms. It does not allow for their installation in service spaces.

A-3.6.2.5.(1) Combustible Refuse Storage.

Storage of refuse consisting of combustible materials including waste paper, cardboard and plastic, and noncombustible materials such as glass and metallic containers can be accumulated in these rooms for the purpose of recycling. This storage is allowed in consideration of a less stringent collection schedule when compared to that of garbage or refuse, which is collected regularly.

A-3.6.3.1.(1) Vertical Service Spaces.

Sentence 3.6.3.1.(1) does not prohibit the internal subdivision of a vertical service space to allow different building services to be installed in physically separated spaces unless other requirements apply (see, for example, Article 3.2.7.10.). Fire separation requirements apply to the perimeter of the group of service spaces. Article 3.6.3.3. has special requirements for linen chutes and refuse chutes.

A-3.6.4.2.(2) Ceiling Membrane Rating.

In construction assemblies that utilize membrane ceiling protection and have been assigned a fire-resistance rating on the basis of a fire test, the membrane is only one of the elements that contribute to the performance of the assembly and does not in itself provide the protection implied by the rating. For the fire-resistance rating of membrane materials used in this form of construction, reference should be made to the results of fire tests which have been conducted to specifically evaluate the performance of this element.

A-3.7.2.1.(1) Window Area Limit.

Part 9 requirements for windows cover a number of subjects, however, this Article refers only to the area limits.

A-3.7.4.2.(1) Sanitary Facilities.

It is assumed that if the sanitary facilities are provided on every storey, the occupant load for the determination of the number of fixtures would be the anticipated occupant load of that storey. If the washrooms are provided in a central location, the number of fixtures should then be based on the total anticipated occupant load for the entire building.

A-3.7.5.3.(1) Shielding of X-Ray Equipment.

Every installation of an x-ray machine or x-ray equipment used for the exposure of persons shall be shielded with a primary and a secondary protective barrier to protect any person who could be exposed to radiation. This protection is required for

- x-ray workers
- persons other than patients undergoing an application of therapeutic or diagnostic x-rays
- persons in adjacent buildings
- persons located outdoors of buildings containing x-ray equipment.

These protective barriers should be designed and installed to comply with requirements of The Healing Arts Radiation Protection Act. Applications for approval for these installations should be addressed to the Ministry of Health.