CANADIAN COMMISSION
ON BUILDING AND FIRE CODES

FINAL REPORT
Alterations to Existing Buildings

Joint CCBFC/PTPACC Task Group on Alterations to Existing Buildings

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This document is a working paper dealing with the national model codes. Work on these codes is carried out under the authority of the Canadian Commission on Building and Fire Codes of the National Research Council of Canada

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Contents

Introduction

This report provides a summary of the developments and recommendations of the Joint CCBFC/PTPACC Task Group on Alterations to Existing Buildings (JTG AEB). The group is composed of three members of the Provincial and Territorial Policy Advisory Committee on Codes (PTPACC) and four members of the Canadian Commission on Building and Fire Code (CCBFC) and is supported by three NRC Technical Advisors.

The absence of clear code requirements for existing buildings is resulting in a patchwork approach to dealing with alterations across Canada, causing confusion in the industry, among regulators and building owners/operators, as well as resulting in potentially unsafe practices.

Specifically, the PTPACC has identified the following concerns:

- lack of a uniform approach across provinces and territories
- increasing work for designers
- ambiguity with respect to the degree of work necessary on the unaltered portion of the building
- project profitability
- a growing market for the alteration of existing buildings

In order to address these and other issues, the JTG AEB has had 8 teleconferences and one face-to-face meeting since the fall of 2016. The JTG AEB has reviewed national and international standards and codes and has sought input from jurisdictions to learn from “early adopters” in this area.

The JTG’s focus has been on developing overarching principles and a general concept that describes the triggers and decision points with respect to code requirements that would apply to the alteration of existing buildings. **The guiding condition is that the overriding trigger for any requirement is voluntary action by the owner (see section on “triggers”).** Once these principles and the concept are approved by the CCBFC, its standing committees can use the information to develop the specific technical requirements for alterations to existing buildings. The JTG AEB would provide assistance if questions and issues arise with the concept during this phase.

The complexity of the task is high and is probably a key factor that has hindered action in this area not just in Canada but around the world. The development of requirements for existing buildings will involve many, if not all, of CCBFC’s standing committees and will require extensive cross-committee coordination.

Background

Since the 1940s, National Model Codes have been continually evolving in order to remain responsive to current and emerging issues, new technologies, materials, construction practices, research, social policy, and the changing needs of Canadian society.

Today's National Codes address the objectives of fire and structural safety, health, accessibility, fire and structural protection of buildings and facilities, as well as the environment (water-use and energy-use efficiency).

Advances in all of these areas over time may have led to some older buildings lagging behind more recently-constructed buildings in important features. For example, energy efficiency and water-use efficiency requirements were only introduced in the NBC as recently as 2012 and 2015.

Increasingly jurisdictions are turning to building codes to address their most pressing social policy goals – such as climate change resilience or the aging population. There is an increasing interest in Canada and abroad to use regulation as a tool to address the shortfalls of not only new construction but also the existing building stock. Regulation is often used when quick and effective action is required.

For example, jurisdictions are increasingly turning to more ambitious building codes as a means of reducing energy use and, in turn, greenhouse gas emissions (GHG) of buildings. Although the application to existing buildings is stated in the National Building Code (NBC), jurisdictions often only apply the NBC to the design and construction of new buildings. Buildings can last 50 or 100 years or longer, so the rate at which new buildings replace these older buildings tends to be relatively low. According to the latest edition (2011) of the Survey on Household Energy Use, almost half (49%) of today's households were built before 1980. Regulations could be a key component of improving the performance of existing buildings at the time of alterations and achieving Canada's long-term policy goals[1].

Economic Implications

There are many reasons to start paying more attention to the potential economic implications related to the alteration of existing buildings.

In Europe, where there are strong governmental policies with respect to the energy performance of new and existing buildings, energy efficiency renovations (i.e. alterations) have played a strong role as a stabiliser of the building sector and the European economy since the financial crisis of 2008. The EU Energy Renovation Market was estimated at €109 billion and 882,900 jobs in 2015, with the residential buildings having the highest share of the market at 65% (Saheb, 2016).

According to CHBA's Economic Impacts of Home Renovation and Repair, there were 586 450 jobs, $34.4 billion dollars in wages and $71.3 billion dollars in investment generated through home renovation and repair in Canada in 2016 (CHBA, 2016). In comparison, the economic impacts related to new construction were lower. In 2016, new construction generated 421 942 jobs, $25 billion dollars in wages and $67 million in investment value (CHBA, 2016). Any regulatory measure or non-regulatory instrument to facilitate the uptake of alterations to existing buildings may increase the economic potential of this industry provided that the regulatory measures are reasonable.

[1] Canada has committed to reducing its GHG emissions by 30% below 2005 levels by 2030.

There is also homeowner appetite for renovations. An Angus Reid poll commissioned by CIBC in May of 2017 determined that almost half (48%) of all Canadian homeowners planned to renovate in the next 12 months (Newswire, 2017). On average, they plan to spend $11,800 and their primary purpose to renovate is to address 'wear and tear.' Without a practical regulatory framework, there is the risk that much of this activity may be avoided or driven underground, not improving the performance of the existing building stock.

As with proposed changes for new buildings, there must be thorough consideration of the impact on all stakeholders when it comes to code requirements for existing buildings. Some stakeholders are particularly concerned about the impact of regulation on affordability. All people need shelter so any regulatory measure – even on voluntary alterations on existing houses and buildings – will need to consider its impact on vulnerable citizens.

Energy Efficiency as a Starting Point

”Environment” is just one of five code objectives. There are four other objectives to consider as well – and they all need to be considered holistically. For example, improving the structural protection of a building to withstand a seismic event could diminish its energy efficiency because of the effects of thermal bridging. Likewise, improving the energy efficiency of a building through exterior cladding could have an impact on fire safety so – depending on the materials used - additional precautions may be needed.

While all code objectives need to be considered, alterations that improve the energy efficiency of buildings has become the driving force behind this initiative. Canada signed on to the Paris Climate Agreement and must regularly report on its progress towards meeting its commitments. There is growing support from all levels of government in Canada and around the world to improve the energy performance of the built environment in light of the Paris Climate Agreement commitments. The resulting *Pan-Canadian Framework on Clean Growth and Climate Change* describes several goals with respect to the built environment and a specific goal with respect to existing buildings:

“Develop a model code for existing buildings to help guide energy efficiency improvements during renovations, with the goal that all provinces and territories adopt it.”

Since one of the primary objectives of the Pan-Canadian Framework is reducing greenhouse gas emissions, there might be pressure for National Model Codes to consider the carbon intensity of different fuels. Currently, National Model Codes are silent on fuel types and focus on reducing the energy use of buildings. The JTG expects that this position would also apply to code requirements for the alteration of existing buildings.

Regardless of the specific strategy, all levels of government will need to work together to develop and implement a comprehensive strategy to achieve deep emission reductions in the building stock as a whole (new and existing buildings) in order to meet climate target commitments.

Other Policy Tools

In the absence of consistent regulatory measures prescribing the improvement of building performance at the time of alterations or non-regulatory measures encouraging these improvements, many existing buildings would be left unchanged for years to come.

In the area of energy improvements, continuing with the status quo could have a big impact on whether Canada can achieve specific policy goals, like its commitment to the Paris Climate Agreement. Canada’s GHG emission reduction commitment is 30% below 2005 levels by 2030.

In general, non-regulatory tools could be developed in conjunction with regulatory tools to achieve comprehensive improvements in the performance of houses and buildings. For example, industry education, product development, energy saving incentive programs, mandatory labelling, demonstration/research projects and consumer education and financing mechanisms could all support the transformation of existing buildings. These types of initiatives would help the industry and the general public prepare for upcoming regulatory changes and set the framework for successful implementation.

Recent Events

Due to recent tragedies, developments with respect to alterations to existing buildings will likely garner considerable attention and scrutiny. The Grenfell Tower in England, which caught on fire on June 14, 2017, resulting in 71 deaths, is an example of one such tragedy.

The Grenfell Tower was an old concrete structure that was recently renovated with an energy-efficient façade. The new cladding was an aluminum composite panel with a polyethylene core – highly combustible – installed over a 2-inch vented airspace (Building Science Corporation, 2017). Once the combustible cladding caught on fire, the airspace provided a continuous supply of oxygen, enabling the fire to spread quickly. The continuous insulation behind the vented airspace was 6 inches of foil-faced isocyanurate – fire-resistant, but not fireproof.

Other examples of combustible cladding fires include the Mermoz Tower in France (May 2012), the Lacrosse apartment in Melbourne (November 2014) and The Address Downtown Dubai (December 2015). Design decisions that improved the thermal performance of these buildings but decreased their fire resistance are now being questioned and scrutinized.

Any recommendation with respect to alterations to existing buildings will therefore need to be deeply analyzed and reviewed by multiple, diverse disciplines to ensure that possible unintended consequences are avoided.

Missed opportunities

The leaky condo crisis in British Columbia and its aftermath is an example of a missed opportunity in terms of upgrade potential.

Of all the 159,979 condo apartments built in British Columbia in the 15 years up to 2000, 45 per cent had leak problems (Stueck, 2008). The repair of the building envelopes could have been a significant opportunity to upgrade these buildings – not just in terms of moisture ingress – but also in terms of improving their energy efficiency. The building envelope already had to be opened up to repair and prevent moisture penetration, which would have been the ideal time to consider upgrading the building's energy efficiency – and with little additional effort. Requirements or guidelines on how to improve the energy efficiency of the building envelope, along with grants or incentive programs, could have gone a long way in terms of reducing the province's carbon footprint. Unfortunately practical requirements or guidelines for apartment strata units did not exist at the time and this opportunity was missed.

Elliott Lake is another example of a missed opportunity in terms of maintenance and repair and potential upgrade. In this case, despite many complaints over the years about leaks and falling pieces of ceiling, municipalities did not enforce, or improperly enforced, their own property standards by-laws. Cheap and ineffective repairs eventually led to the collapse of a section of the roof, resulting in the death of two women and the injuries of several others.

Evidence from the Elliott Lake Commission Inquiry indicates that the collapse of the Algo Mall in 2012 was caused by the severe rusting of a critical connection between a beam and a column.

Mediocre design, untested technology, faulty implementation, improper maintenance and poor oversight were largely to blame for the failure (Bélanger, 2014).

These two examples illustrate the need for clear direction when it comes to the alteration of existing buildings in terms of design requirements and compliance.

Scope

PTPACC paper

In 2008, the Provincial and Territorial Advisory Committee on Codes (PTPACC) produced a scoping document on *Provincial and Territorial Interest for Building Code Requirements on Renovation-Alteration of Existing Buildings.* The paper suggested including specific requirements for existing buildings in the model National Building Code with the primary goal of facilitating the design, analysis and approval of renovation work on existing buildings.

Part 3 and Part 9 buildings

The Codes divide buildings into two broad categories.

- Part 3, 4, 5, and 6 requirements apply to all buildings but are mostly used for buildings that are more than three stories in building height or more than 600 m^2 in building area. They cover all types of occupancies. The provisions are mostly performance-based and require engaging a professional to ensure that the requirements are interpreted and applied correctly.
- Part 9 requirements apply to “houses and small buildings.” These buildings can be no more than three stories in building height and cannot exceed 600 m^2 in building area, and only apply to certain types of occupancies. The provisions include some performance-based requirements but are predominantly prescriptive-based requirements, enabling their use by a wide variety of stakeholders (e.g. owners, builders, contractors) in the construction community.

For the purpose of this report, the term “buildings” applies to both large and small buildings and houses.

Heritage Buildings

The JTG AEB debated whether heritage, or historic, buildings should fall under the scope of alterations to existing buildings. These buildings are usually covered under other provincial/territorial/municipal legislation such as the Ontario Heritage Act and the B.C. Heritage Conservation Act. The majority of legislation affecting heritage buildings is created at the municipal level in Canada. For example, the 1994 B.C. Heritage Conservation Statute Amendment Act enables municipal powers to protect local heritage from alteration or destruction (Vancouver Heritage Foundation, 2018).

However, these acts or statutes may also refer back to national codes. Furthermore, some aspects with heritage status pertain to elements of a building (e.g. staircase, windows, etc.) and do not necessarily apply to the entire building. For this reason, the JTG AEB recommends that heritage buildings should be within the scope of regulatory measures but that additional flexibility should be applied to ensure that alteration requirements are reasonable (see Principle #7). The regulatory measures should work in tandem with provincial, territorial or municipal acts/statutes. There should also be some text in the Code that reflects this principle.

Terms of Reference

The Terms of Reference of the JTG AEB were originally approved by CCBFC and PTPACC on June 29, 2012 and were revised on May 2, 2016.

The Mandate of the JTG AEB is described below:

- Identify all problems the jurisdictions are having
- Define the scope of new requirements for the alteration of existing buildings that address these problems
- Differentiate administrative or policy issues from technical code requirements, define what constitutes a renovation and alteration
- Identify those parts or section of codes that will likely have to be examined
- Identify those areas of the Code that PTPACC does not want addressed
- Create an effective link between the CCBFC, PTPACC and all standing committee Chairs at critical milestones.

JTG AEB Activities

Meetings

The Joint Task Group has met 9 times on the following dates:

Meeting #	Date	Meeting type
1	October 11th, 2016	teleconference
2	April 25th, 2017	teleconference
3	June 21st, 2017	teleconference
4	August 9th, 2017	teleconference
5	October 24th, 2017	teleconference
6	November 27th, 2017	teleconference
7	January 24th, 2018	teleconference
8	April 4 and 5th, 2018	face-to-face
9	May 28th, 2018	teleconference

Research and Analysis

The JTG reviewed Canadian and international examples of codes and by-laws that set requirements for existing buildings at the time of alteration. All of the activities described below fed into the development of the overarching AEB concept (illustrated by the flow chart on page 11).

Legal Precedents

The JTG AEB reviewed legal precedents in order to ensure that code definitions do not contradict existing legal precedents and whether there are legal definitions associated with AEB terms (e.g. alteration, renovation, redevelopment, etc.).

It was apparent that there was no consistency in the legal use of the terms. Due to the variability of use shown from the research, members agreed there is a need to define terms for the purpose of the JTG AEB rather than look for a legal precedent.

Environmental Scan of National and International Initiatives

Staff conducted an environmental scan of regulatory initiatives and enabling requirements and guidelines that promote alterations to existing buildings through voluntary or mandatory measures. The JTG and staff continue to update the scan as new initiatives come to light.

Environmental Scan of Voluntary Programs, Grants or Tax Incentives

Staff conducted an environmental scan of voluntary programs, grants and tax incentives that encourage alterations to existing buildings. Most of the current initiatives are related to energy efficiency and accessibility. The JTG and staff continue to update the scan as new initiatives come to light.

Questionnaire Update

In 2008, eight provinces (Ontario, British Columbia, Alberta, New Brunswick, Manitoba, Yukon, Nova Scotia and Quebec) responded to a request for information from PTPACC concerning their approach and – if applicable – their code requirements for alteration on existing buildings.

The questionnaire's original focus was to give guidelines for the next steps of developing the basis of code requirements for existing buildings that are renovated. The JTG reviewed the information in the responses and incorporated the information in its concept and principles.

Terms and Definitions

The JTG AEB reviewed legal precedents to determine if they could inform the discussion on terms and definitions. It was apparent that there was no consistency in the use of terms associated with alterations to existing buildings. Due to the variability of use shown among the legal cases, members agreed that – rather than rely on a legal precedent – there was a need to define terms at least for the purpose of the discussion by the JTG and possibly in the codes.

Subsequently, the JTG AEB reviewed a variety of terms and definitions associated with alterations to existing buildings and used components of dictionary definitions or existing definitions from other codes to create new definitions that align with the conceptual diagram (i.e. decision process) of the JTG AEB (see "Defined Terms").

Contractual and Legal requirements of Insurance Policies

The JTG AEB looked into the contractual and legal requirements of insurance policies that apply to existing buildings. Damage due to unexpected events such as flooding, fire or high wind could trigger a repair or an alteration depending on the scope of the damage. Insurance policies cover "direct damage" from an "insured peril." If the scope of the damage is extensive, a total reconstruction could be required. All insurance repairs need to adhere to current building code requirements.

Many insurance policies do not provide coverage for the additional cost of rebuilding to comply with by-law upgrades. Customers can purchase this coverage, but many do not.

Insurance cases are not included as part of the current list of AEB triggers because insured claims are fortuitous (i.e. they are not voluntary).

JTG AEB Recommendations

Application

The JTG agreed to develop provisions describing the application of the requirements rather than defining “existing buildings.” The JTG concluded that application provisions allow more flexibility and adjustments as required.

Location of Requirements

The location of the requirements may affect how the requirements are written and how existing code requirements may be referenced in the process.

Code or Guideline?

The JTG reviewed examples of requirements for existing buildings, where some were separate codes (ICC), some were parts in general building codes (Ontario, Québec), some were guidelines (e.g. Australia), and one was a municipal bylaw (City of Vancouver). After considering all these options, the JTG recommended that AEB requirements for the National Codes be located within the bodies of each of the Codes (i.e. not a guideline). This does not preclude the creation of notes and guidance material that would assist designers and officials in the interpretation and consistent application of the AEB requirements.

New Section, New Part or New Code?

Again, several options were considered in terms of user friendliness, ease of maintenance and ease of adoption. These included:

a) New Part for existing building in NBC (centralized hub) but referenced in other Codes.
b) New Section for existing buildings in each Part, in each Code
c) New Part for existing buildings in each code (e.g. Part 10 in NBC, Part 9 in NECB, Part 3 in NPC).

The JTG agreed that in any case, the NFC should be dealt with separately since it already applies to existing buildings.

The JTG AEB recommends that alterations to existing buildings be addressed in a new Part in the NBC, NPC and NECB (option c). This option offers the best balance of user friendliness, ease of maintenance and ease of adoption. For ease of reference, the parts could all have the same number (for example Part 10) regardless of how many other parts are currently in that code.

Principles

The JTG has developed a list of overarching principles. The purpose of these principles is to provide guidance to the Standing Committees for the development of technical requirements. These principles include:

Principle 1: Closing the performance gap between the current code and the existing building stock.

The goal of this principle is to recognize that requiring all existing buildings to meet the current code is not a realistic goal as it would be far too expensive in terms of material, labour and compliance costs and could stifle the improvement of existing buildings rather than encourage it. Instead the goal of this principle is to reduce the performance gap between existing and new

buildings as much as possible by making improvements to existing buildings where it is logical, where it takes relatively little effort, and where it is as cost-effective as possible.

Principle 2: Maintaining or increasing the life safety and overall building performance level. (An alteration cannot make the building worse.)

The goal of this principle is that alterations to an existing building should never reduce the health of future occupants, their life safety or the overall performance level of a building from its current state. Instead the aim is to increase the building performance as much as reasonably possible in the areas of the code objectives.

Principle 3: Avoiding negative unintended consequences or unrealistic expectations.

The goal of this principle is to point out that attention to building science and cost-effectiveness is required for every alteration to avoid unintended consequences or unrealistic expectations.

For example:

- undertaking interior insulation on a solid masonry wall without considering the movement and effects of moisture in that wall that may now be entirely in the frost zone - which can cause spalling and damage the masonry;
- undertaking changes to interior walls without considering asbestos remediation;
- requiring stairways to meet new rise and run dimensions where it would be impossible to do so without structural changes; or
- requiring the installation of low flow/low flush fixtures where the slope of the existing pipes would result in insufficient flow to move the effluent

Principle 4: Ensuring that when a repair, maintenance or alteration is in progress, the building cannot be left in an unsafe state.

The goal of this principle is to recognize that all construction and demolition sites need to ensure adequate protection of its workers and the public for which requirements already exist.

- Part 8 of the NBC (Safety Measures at Construction and Demolition Sites) already describes safety provisions related to the alteration and repair of buildings.
- Part 5 of the NFC (Hazardous Processes and Operations) already applies to processes and operations that involve a risk from explosion, high flammability or related conditions that create a hazard to life safety.

These parts may have to be reviewed to ensure they align well with the alteration of existing buildings, which may be occupied at the time of the alteration.

Principle 5: All regulatory measures should be reasonable[2], pragmatic and effective (applying Smart Regulation[3] principles).

The goal of this principle is to recognize that the practicality of many alterations will depend on several factors (e.g. the extent of the alteration, the type of alteration paired with the number of regulatory measures imposed on the project, etc.). If the overall project assessment concludes that it would make more sense to tear down a building and rebuild than abide by the regulatory measure, the regulatory measure may not be effective, reasonable or efficient.

[2] In this context, the term “reasonable” means appropriate measures that don’t impose a disproportionate or undue burden.

[3] http://publications.gc.ca/collections/Collection/CP22-78-2004E.pdf

Principle 6: Allowing a degree of flexibility so as to encourage alterations to existing buildings rather than placing an undue burden on owners, which could inspire them to avoid alterations altogether.

The goal of this principle is to recognize that every alteration is unique and often involves considerable commitment on behalf of the owner. A certain degree of flexibility between the owner, professional and officials will help improve the performance of the existing building stock with as little effort as possible.

Principle 7: Allowing a degree of flexibility so as to preserve officially recognized (designated/registered) heritage elements.

The goal of this principle is that the code requirements for existing buildings would apply to all elements that are not covered under the applicable heritage legislation. While heritage buildings should adhere to regulatory requirements to the greatest extent possible either directly (i.e. prescriptive code requirements) or through alternative compliance routes, they should also benefit from the largest amount of flexibility allowed.

Principle 8: Regulatory measures and voluntary programs should complement each other.

The goal of this principle is that the regulatory framework considers how non-regulatory initiatives (e.g. mandatory labelling, incentive programs, tax credits) may benefit and integrate with future AEB code requirements. Non-regulatory and regulatory tools should work seamlessly together to achieve comprehensive results for Canada's construction industry, regulators and owners. An example of what this might look like is shown in Figure 1.

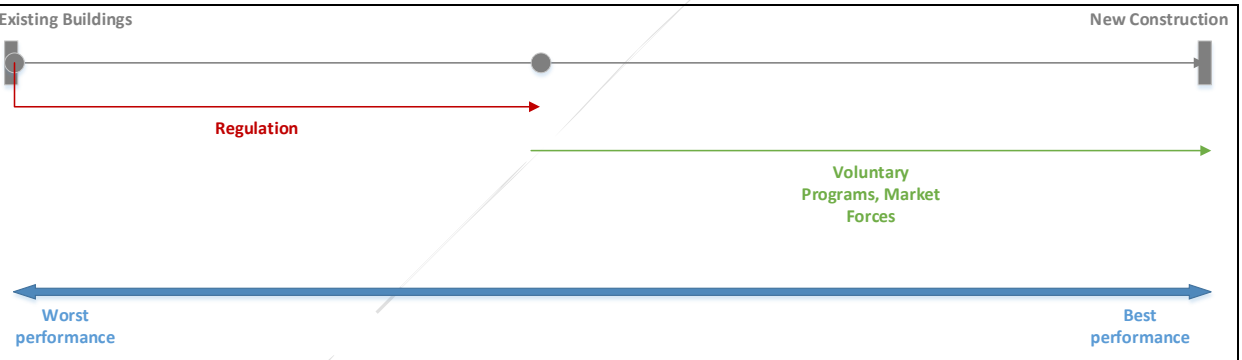

Figure 1. Possible framework for the role of regulation and voluntary programs/market forces in improving the performance of existing buildings

Terminology

The JTG AEB spent considerable time researching and reviewing a variety of terms associated with alterations to existing buildings. There was a lot of discussion about which terms should be defined and which should not. In the end, the JTG simplified the terminology to a few key terms based on the logic of the conceptual diagram (see below).

Even though it is used significantly in the industry, the JTG AEB recommends not to use or define the term "retrofit" and instead to explain the reasons why in an appendix note, because the term can be confusing due to its various connotations. For example, officials in some jurisdictions use the term "retrofit" to mean "retroactively applying new code requirements." The

JTG AEB heard from the PTPACC members that retroactive application of alterations to existing buildings was not the intention of this initiative.

The JTG AEB also recommends to use the word “alteration” rather than “renovation” and to direct the standing committees to review code documents to ensure consistent use of the term “alteration” across all code publications.

Defined Terms

The JTG AEB recommends that the working definitions still need to be diligently reviewed by the standing committees. The JTG AEB proposes the following draft definitions:

Maintenance or repair or replace with similar[4]:

- The repair or replacement of any part or component of an existing building for the purpose of its maintenance or to correct damage or failure.
- It includes the removal and replacement of any existing part, component, equipment, or fixture using a new part, component, equipment or fixture that serves the same purpose.
- It usually involves no more than one damaged or failed component of an assembly or system.

Minor alteration:

- It is typically a standalone project;
- It is often isolated and small in scope or building area; and
- It does not:
    - involve modification to structural elements;
    - impact other systems in other areas of the building;
    - render the active life safety system inoperative; or
    - make the means of egress unusable.

Major alteration:

- It applies to everything that doesn't fall under the scope of a minor alteration.
- Other systems need to be considered. These systems might be indirectly linked to the alteration project (e.g. heating system and ventilation system after an extensive building envelope upgrade).

System:

A “system” refers to a combination of materials, components or assemblies and, if applicable, their junctions that achieve a complete major function in the design of a building or part of a building (e.g. HVAC system, building envelope system, structural system, air barrier system, etc.).

[4] Most replacement parts currently available on the market will be of higher performance than the defective part, particularly when it comes to energy efficiency. For example, NRCan’s Office of Energy Efficiency regulates the minimum efficiency of furnaces, boilers, air conditioners and water heaters among others. These minimum efficiencies have improved over time and are projected to improve even further with its *Market transformation roadmap for windows, space heating and water heating technologies.*

Assembly:

An “assembly” refers to a combination of materials and components that achieve a complete major function in the design of a building or part of a building (e.g. an airtight wall assembly and an airtight roof assembly would only form an air barrier system if they are also connected at the junction into a functioning system).

Component:

A “component” refers to a distinct manufactured item with a specific function. For example, an individual window is considered a component whereas all the windows collectively form part of the building envelope system. Replacing a defective window would be considered an individual component and therefore exempt. Replacing all the windows in a building - usually done for aesthetic reasons or to improve performance - would be considered altering a system and would therefore not be exempt.

Triggers

The JTG discussed and analyzed various triggers – the critical decision points that determine whether or not a building requires mandatory upgrades. The JTG also discussed the extent of those upgrades/requirements. For the purpose of this report, all proposed triggers are based on a voluntary action by the building owner to alter a building, unless required by an authority (e.g. unsafe conditions). The idea is that when an owner has decided to alter, upgrade or change the function of a building, there could be additional requirements to improve the energy efficiency, accessibility, seismic resilience, structural integrity or fire safety/protection of that building to meet the current code. The extent of the technical requirements will depend on the extent of the alteration or change of occupancy.

The JTG AEB recommends that the Standing Committees consider the following triggers (as indicated on the conceptual diagram):

1. Maintenance or repair or replacement with similar
    a. single component of a system (without further modifications)
    b. similar in function
2. Change of occupancy type
3. Addition
4. Space reconfiguration
5. System(s) upgrade
6. Other[5]

The JTG agreed not to include the cost of an alteration as a trigger because cost changes over time and the cost of services and materials varies significantly across Canada depending on where the building is located (i.e. metropolitan area versus the North).

A “systems upgrade” means improving one or several of a building’s systems. This could mean improving the structural or framing system, mechanical system, exterior cladding system, window system, HVAC system, etc.

The JTG AEB has started to develop a library of examples to explain the application of the AEB concept in conjunction with the principles. It is expected that the standing committees will review these examples and assist in developing more examples for the benefit of stakeholders.

[5] “Other” is a catch-all trigger for potential project types that have not yet been identified by the JTG AEB.

Conceptual Diagram

The JTG recommends a concept very comparable to the concepts used in Ontario's building code Part 11 and Quebec's building codes Part 10 on existing building. The JTG also reviewed the Bylaw 10908 of the City of Vancouver and the ICC codes in more detail.

The currently proposed concept has:

- an exempt level (maintenance or repair or replace with similar) – where buildings or interventions are exempt as long as the performance of the building is not reduced by the intervention.
- a requirement level – where all buildings have to comply with some requirements and – based on building type, project size and intervention complexity – the level of requirements are divided into two groups: "minor alteration" or "major alteration."

The conceptual diagram (see below) illustrates the decision points and triggers that lead to the following end points:

- Exempt
- Minor Alteration
- Major Alteration

Conceptual diagram

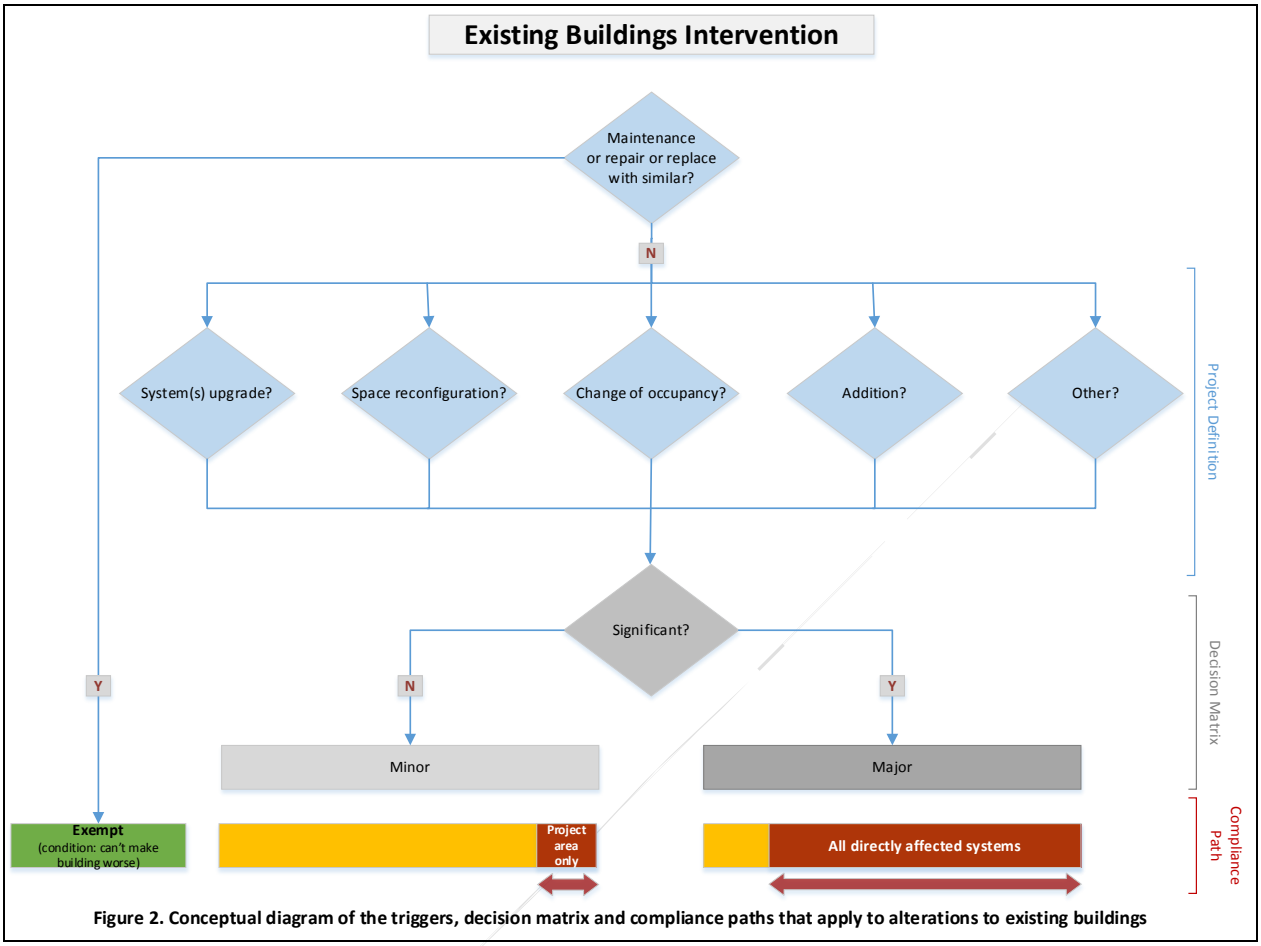

Figure 2. Conceptual diagram of the triggers, decision matrix and compliance paths that apply to alterations to existing buildings

Notes:

- The current code applies to both minor and major alterations. The difference between minor and major is the significance of the alteration.
- The significance of the alteration determines the extent to which the current code applies.
- SCs will determine the scenarios or case studies upon which an alteration should be considered major or minor and the extent to which relaxations should be provided.
- Regulatory measures can work with incentive programs to encourage additional upgrades at specific windows of opportunity.
- A "system" refers to a combination of materials, components or assemblies and, if applicable, their junctions that achieve a complete major function in the design of a building or part of a building (e.g. HVAC system, building envelope system, structural system, air barrier system, etc.).

Application of Concept

Exemption

The Standing Committees would need to determine which situations are exempted on the bases of maintenance or repair or replacement to correct damage.

Minor Alteration

The requirements for a minor alteration are proposed to be:

- limited to the project area and default to the current code requirements (unless relaxations are given); and
- only apply to the element(s) being altered in the project area.

A reduction in requirements below the current Code (i.e. relaxations) involves two levels:

- leave it alone (do nothing)
- relaxations between doing nothing and following current Code

The Standing Committees would need to address the levels of relaxation that should be applied to a variety of scenarios (e.g. examples/case studies).

Major Alteration

The requirements for a major alteration are proposed to be:

- All affected systems in the area of work must meet the current code.
- Other areas/elements that are impacted by the alteration in the building need to be determined (e.g. correct sizing of heating and ventilation equipment after a building envelope upgrade or an addition). These areas need to at least comply with ‘minimum mandatory alteration requirements’ (set by standing committees depending on scenarios; need to avoid unintended consequences).
- Where the alteration creates an opportunity to raise performance level, the performance level of other systems and elements may be increased (policy decision of the province or territory).

Opportunities to raise the performance level are often associated with alterations that have significant interdependence. For example, cladding removal is linked to insulation opportunity because it provides a rare opportunity to insulate beyond the current level. These opportunities could be linked to other policy tools to encourage stakeholders to go beyond code requirements (see Section on “Other Policy Tools”).

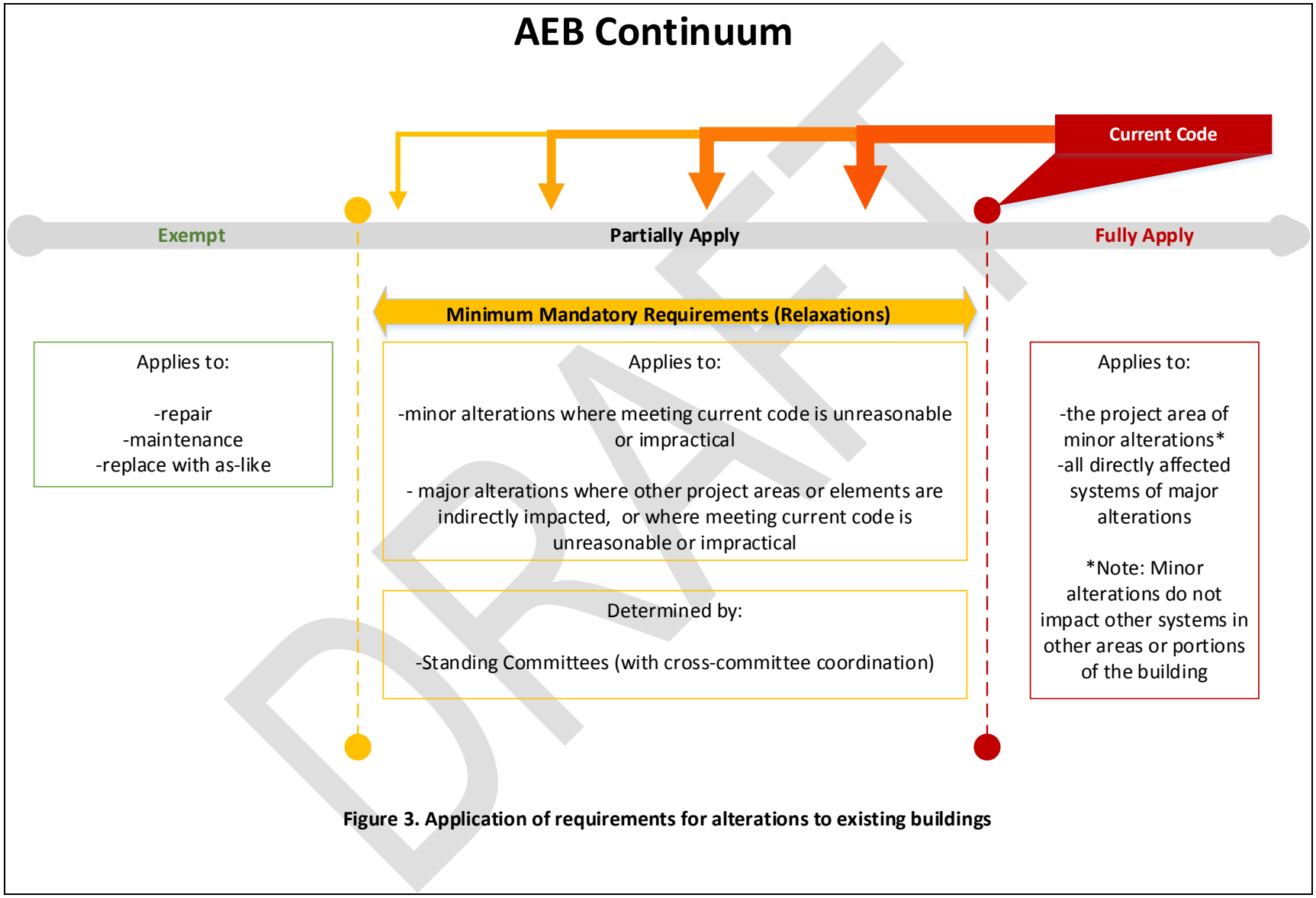

Figure 3. Application of requirements for alterations to existing buildings

Summary of recommendations

1. Provisions should be developed to describe the application of the requirements for existing buildings rather than define “existing buildings” (pg 8)
2. AEB requirements should be located within separate parts in each of the Code (except for the NFC) (pg 8)
3. AEB requirements should follow a set of 8 principles (pg 8)
    1. Closing the performance gap between the current code and the existing building stock.
    2. Maintaining or increasing the life safety and overall building performance level. (An alteration cannot make the building worse.)
    3. Avoiding negative unintended consequences or unrealistic expectations.
    4. Ensuring that when a repair, maintenance or alteration is in progress, the building cannot be left in an unsafe state.
    5. All regulatory measures should be reasonable, pragmatic and effective (applying SMART regulation principles).
    6. Allowing a degree of flexibility so as to encourage alterations to existing buildings rather than placing an undue burden on owners, which could inspire them to avoid alterations altogether.
    7. Allowing a degree of flexibility so as to preserve officially recognized (designated/registered) heritage elements.
    8. Regulatory measures and voluntary programs should complement each other.
4. The term “retrofit” should not be used due to potential confusion associated with its various connotations (pg 10).
5. The requirements should be based on the voluntary action of the building owner and be based on the following 6 triggers (pg 12):
    - Maintenance or repair or replacement with similar
    - Change of occupancy type
    - Addition
    - Space reconfiguration
    - System(s) upgrade
    - Other
6. Depending on the scope of the alteration, projects should be categorized as follows (pg 13):
    - an exempt level (maintenance or repair or replace with similar) – where buildings or interventions are exempt as long as the performance of the building is not reduced by the intervention.
    - a requirement level – where all buildings have to comply with some requirements and – based on building type, project size and intervention complexity – the level of requirements are divided into two groups: “minor alteration” or “major alteration.”

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