RESILIENT HERITAGE:

Sensible Approaches to Sustainable Conservation

CURRENT CHALLENGES

- An ever-increasing focus on building performance has led to many new challenges in the conservation of heritage buildings.
- One-size fits all solutions in our building codes and policies do not recognize either the inherent performance of existing buildings or the many alternative ways in which building performance can be improved without destroying heritage character.
- The impact of building code compliance is causing massive and wasteful destruction at a time when we need to reduce landfill and conserve existing resources.

ISSUES: BUILDING CODES

- Existing Building Codes do not recognize the performance capacity of existing and heritage buildings.
- They do not regulate or recognize ‘aesthetics’ or ‘heritage value.’
- As they were formulated or revised after buildings were constructed, existing and heritage buildings are by definition non-conforming.
- It is therefore difficult, costly and sometimes impossible to achieve Building Code conformance.
- Building Codes keep getting more and more restrictive, making it increasing difficult to ensure conformance.

ISSUES: BUILDING CODES

- We cannot tear every building down to achieve Building Code conformance, as this is inherently unsustainable.
- However we must make existing and heritage buildings safe, and improve energy performance.
- How do we resolve the inevitable conflicts between the expectations that we have for new buildings with the desire to repurpose existing buildings?

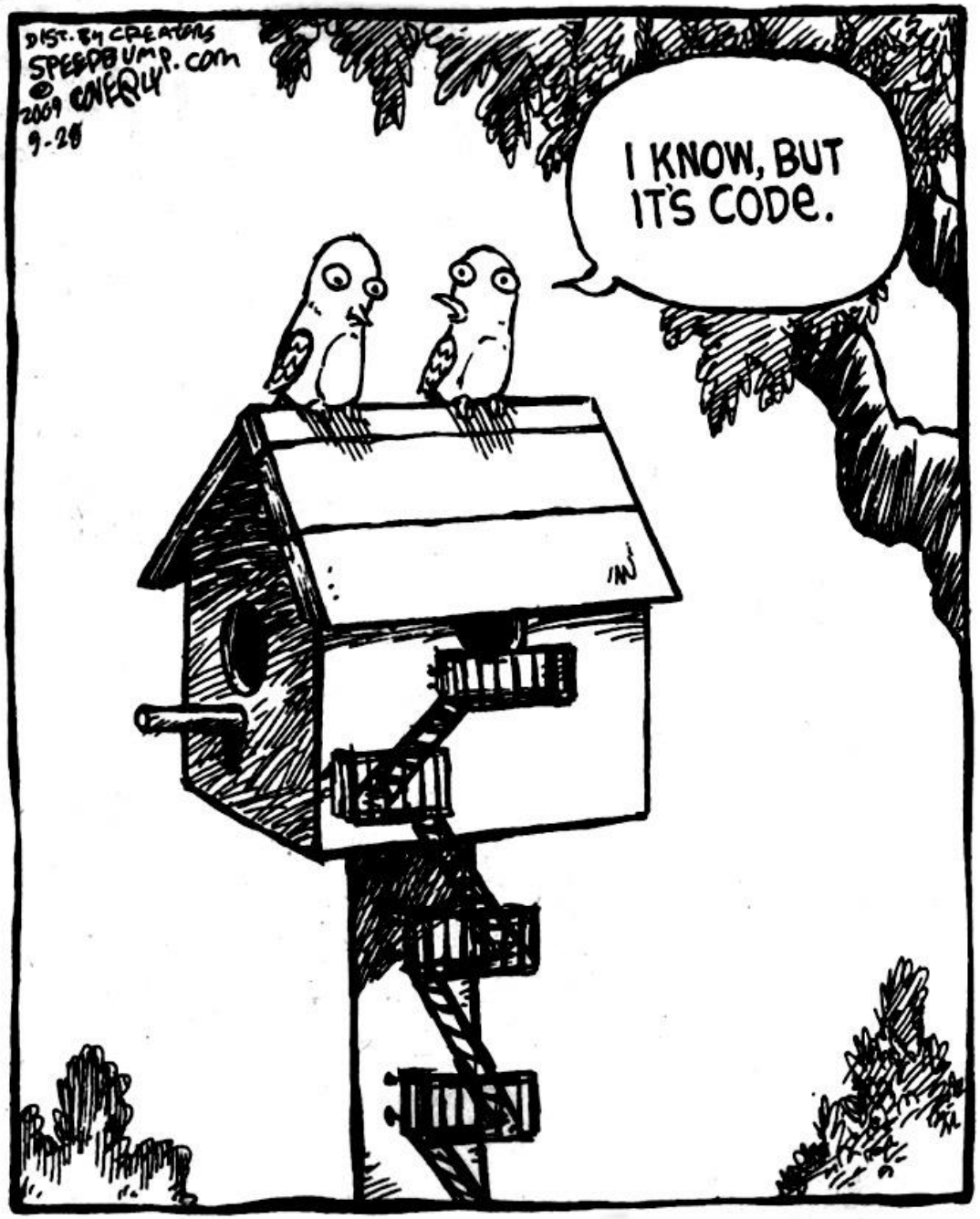
ISSUES: SPECIFICATIONS

- Existing materials may be performing perfectly well, and may be nowhere near the end of their anticipated lifespan.
- It may be difficult to quantify ‘condition.’
- It is likely impossible to ‘guarantee’ lifespan.
- It is therefore extremely difficult to provide specifications that accurately assess inherent performance and how to treat materials and assembles.

ISSUES: SPECIFICATIONS

- However we must provide sufficient information to give certainty to the construction process.
- And again, how do we resolve the inevitable conflicts between the expectations that we have for new buildings with the desire to repurpose existing buildings?

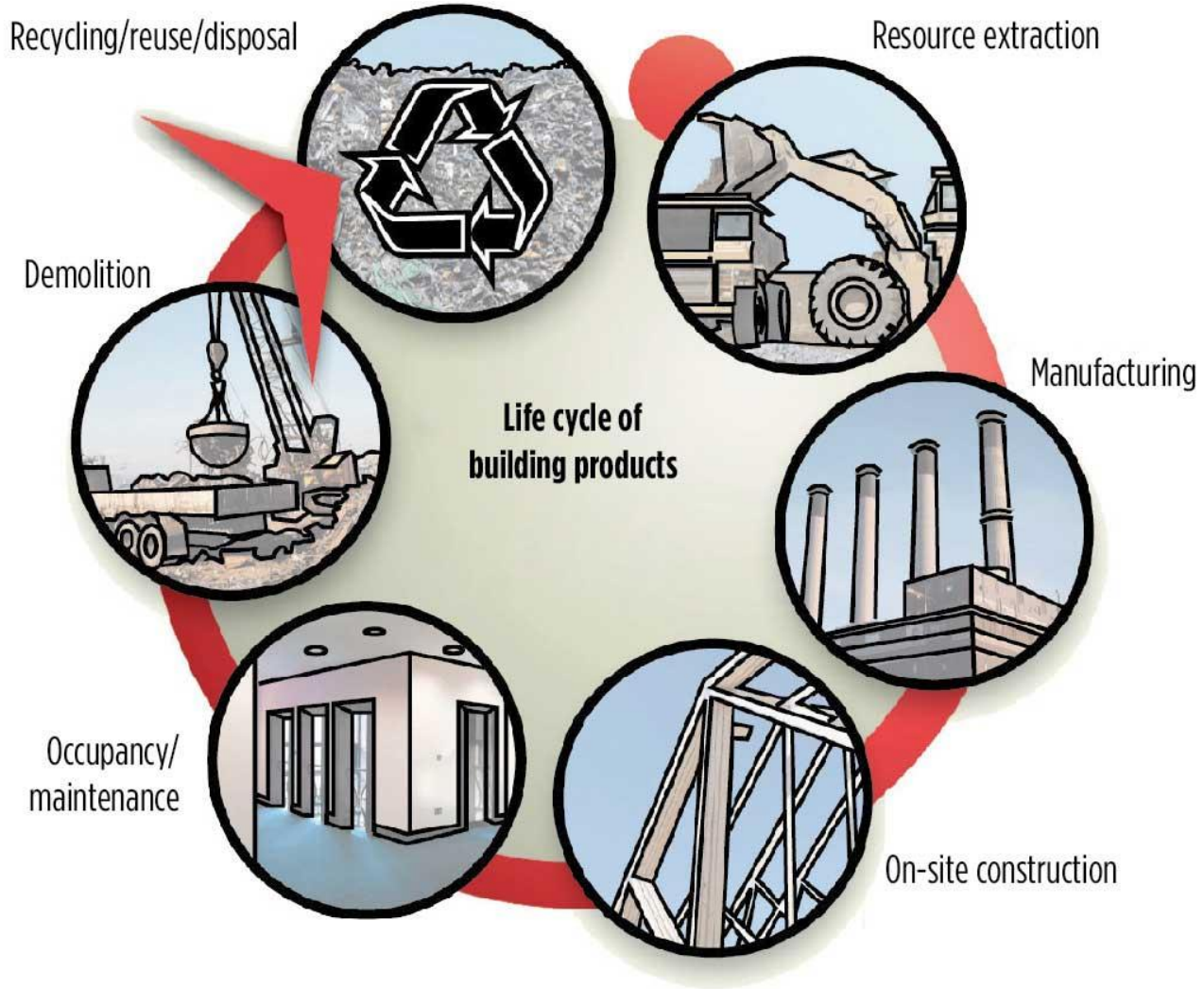
SPEED BUMP


DIST. BY CREATORS
SPEEDBUMP.COM
© 2009 CONERLY
9-28
I KNOW, BUT IT'S CODE.


1989 Loma Prieta Earthquake
STOP

ISSUES: LEED CERTIFICATION

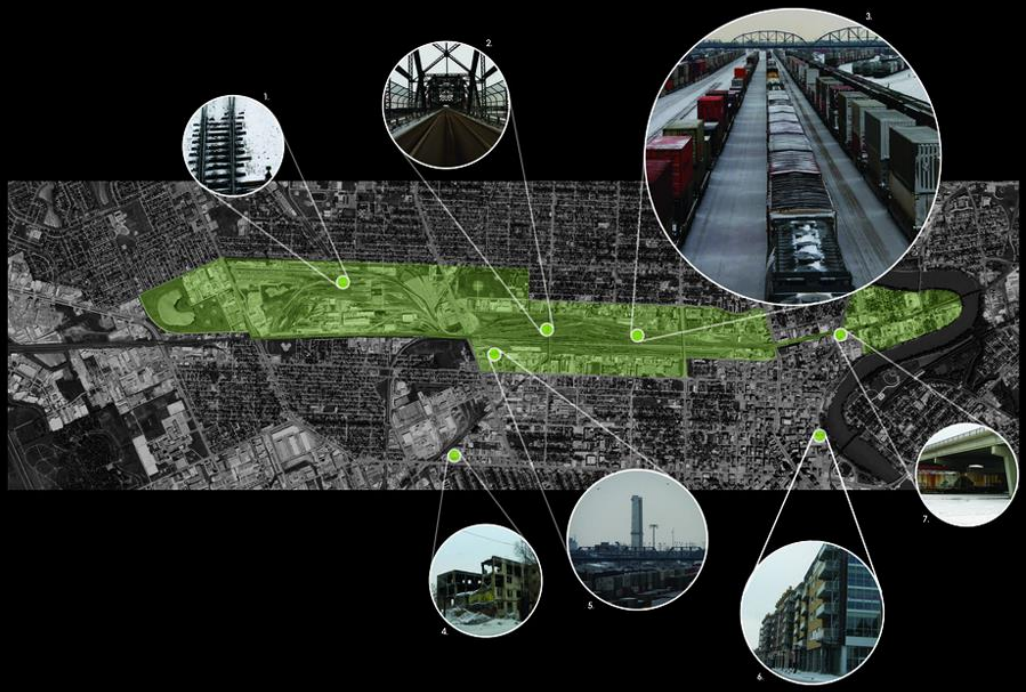
- LEED is designed for new construction, and does not adequately recognize the inherent sustainability of rehabilitation.
- LEED does not measure embodied energy.
- LEED does not measure avoided impacts.
- LEED does not recognize degradation over time.
- LEED does not measure lifecycle impacts.



LIFE CYCLE OF BUILDING PRODUCTS: EACH STAGE IN THE LIFE CYCLE OF PRODUCTS [AND THE WHOLE BUILDING] IS ASSESSED FOR FLOWS TO AND FROM NATURE.

ISSUES: SUSTAINABILITY

BENEFITS OF HERITAGE CONSERVATION



Environmental

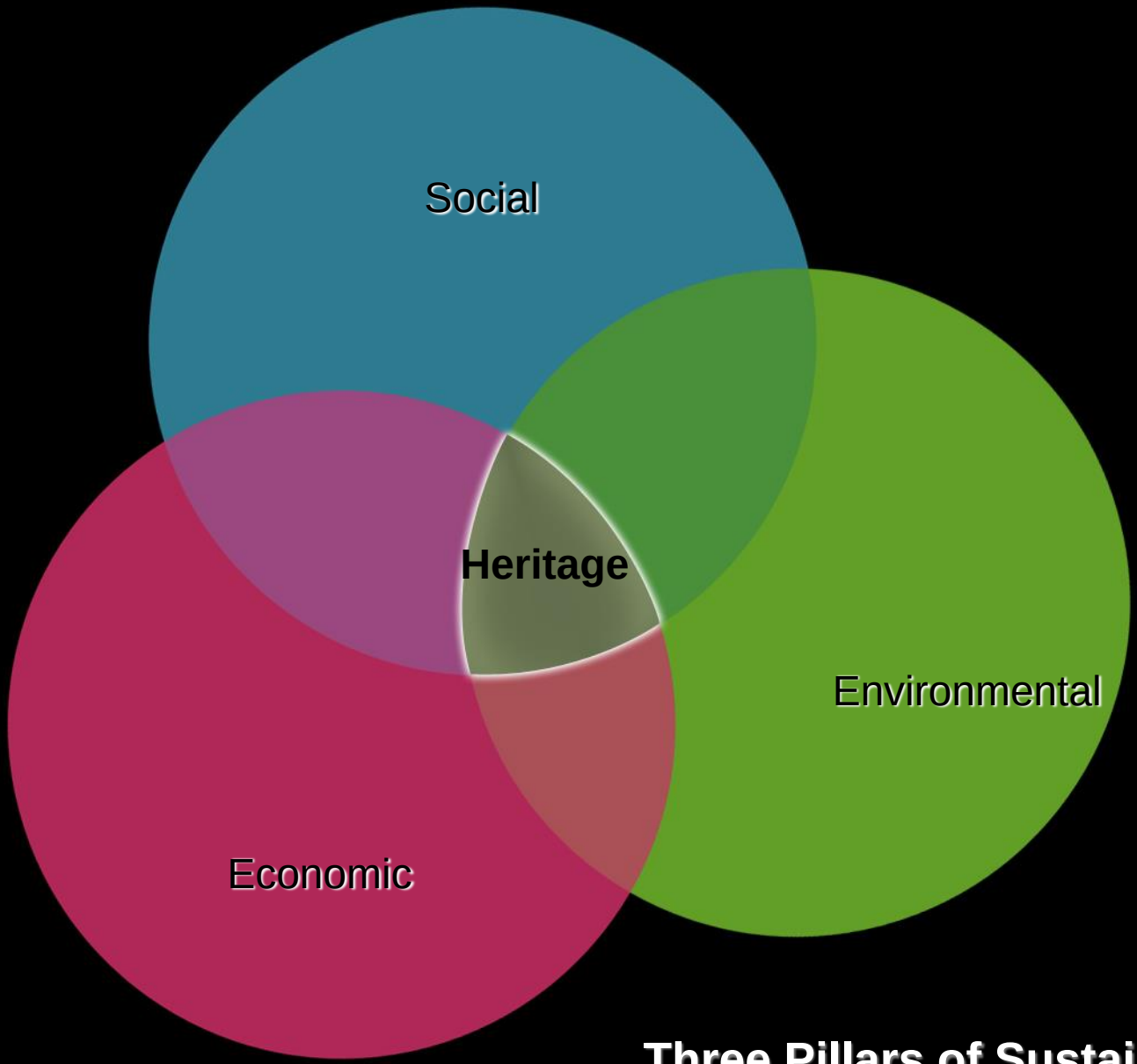
- Reduced waste and landfill
- Conserved embodied energy
- Reused and recycled buildings and material
- Reduced sprawl and impact on infrastructure

Economic

- Reduced development costs
- Increased property value
- Less wasteful: Life cycle costing model
- Supports local economies

Social & Cultural

- Conserves communities and identities
- Builds community capacity and social inclusion
- Provides affordable housing
- Supports urban revitalization



Three Pillars of Sustainability

“Old ideas can sometimes use new buildings.

New ideas must use old buildings.”

Jane Jacobs

ISSUES: SUSTAINABILITY

"The greenest building is the one already built…"

Carl Elefante, Quinn Evans Architects

AVOIDED IMPACTS

EMBODIED ENERGY

EMBODIED ENERGY

- INITIAL EMBODIED ENERGY: The non-renewable energy consumed in the acquisition of raw materials, their processing, manufacturing, transportation, and construction. Consists of:
  - DIRECT ENERGY: The energy used to transport building materials to the site, and then to construct the building.
  - INDIRECT ENERGY: The energy used to acquire, process and manufacture the building materials, and transport them to the site.
- RECURRING EMBODIED ENERGY: The non-renewable energy consumed to maintain, repair, restore, refurnish or replace materials, components or systems during the life of the building.

May T. Watts Appreciation Society ★ ★ ★

Embodied Energy: *concept model*
Embodied Energy Calculator
Demolition Energy Calculator
Gasoline Converter
Teardown Calculator
survey model
ACHP report

Demolition Debris

Total Teardowns

May T. Watts

blog

thegreenestbuilding AT gmail DOT com

www.thegreenestbuilding.org

The Greenest Building is the One Already Built

"Preservation saves energy by taking advantage of the nonrecoverable energy embodied in an existing building and extending the use of it" - *ASSESSING the ENERGY CONSERVATION BENEFITS of HISTORIC PRESERVATION: Methods and Examples*, Advisory Council on Historic Preservation.

Welcome to the May T. Watts Appreciation Society sponsored Embodied Energy Calculator.
As far as anyone can tell, Carl Elefante deserves the credit for introducing the phrase "The Greenest Building is the One Already Built." And we'd like to say: Thanks, Carl!

There may still be some bugs below, and we hope to keep adding functionality. If you come across something, or just want to help, drop us a line at thegreenestbuilding AT gmail DOT com. For now, go forward and calculate...

EMBODIED ENERGY CALCULATOR

To use this calculator, begin by choosing your property type from the box on the left. In the box labeled gross floor area enter your building's total square footage. Click calculate to get the amount of energy "embodied" (that's the total energy spent in the production of a building, from the manufacture of materials to their delivery to construction) in your building!

Select Your Building Type: X gross floor area sq. ft. = MBTU

Embodied Energy Investment*

Calculate Clear

DEMOLITION ENERGY CALCULATOR

When we're looking at teardowns, embodied energy is only part of the equation. To use this calculator, begin by choosing your property type from the box on the left. In the box labeled gross floor area enter your building's total square footage. Click calculate to get the amount of energy "needed to raze, load, and haul away construction materials."*

Select the Construction Type: X gross floor area sq. ft. = BTU

Demolition Energy*

Calculate Clear

NEXT STEPS

With a good online energy converter, you can do loads with embodied energy (bear in mind, for many calculations you will need BTUs, so multiply your MBTU number by 1000 to get BTUs). Here is one popular application:

MOLLY BROWN HOUSE, DENVER (1887-1892)

Embodied Energy Investment of 42,583 US gallons of gasoline

“Life Cycle Assessment Study of Embodied Effects for Existing Historic Buildings” Parks Canada, 2009

Birks Building, Winnipeg, Case Study: the avoided impact of the Birks Building is equivalent to the CO2 Emissions from the electricity use of 473 homes for one year.

3.2 Case Study 2 - The Birks Building

276 Portage Avenue, Winnipeg

Tenants:

Government offices – Land Titles Office

Area: 3,030 m² of office space; 855m² footprint

The Birks Building was Winnipeg's first 'permanent' facility for the Young Men's Christian Association (YMCA). The YMCA obtained the Portage property in 1890, opening one of the best outfitted YMCAs in Canada in early 1901. Henry Birks and Sons, a jeweler, moved into the premises in 1909 and had the exterior transformed architecturally in 1910, while the interior was renovated into one of the city's most functional and exclusive shops in 1914. Major alterations were made in 1928, 1951-52, the late 1960s and mid-1970s. The 1951 work included installation of a granite base and Tyndall stone facings around solid bronze show windows on the ground floor. Corner columns and vestibule walls were lined with Travertine marble. In 2006 a major renovation was undertaken and the building is now entirely office space.

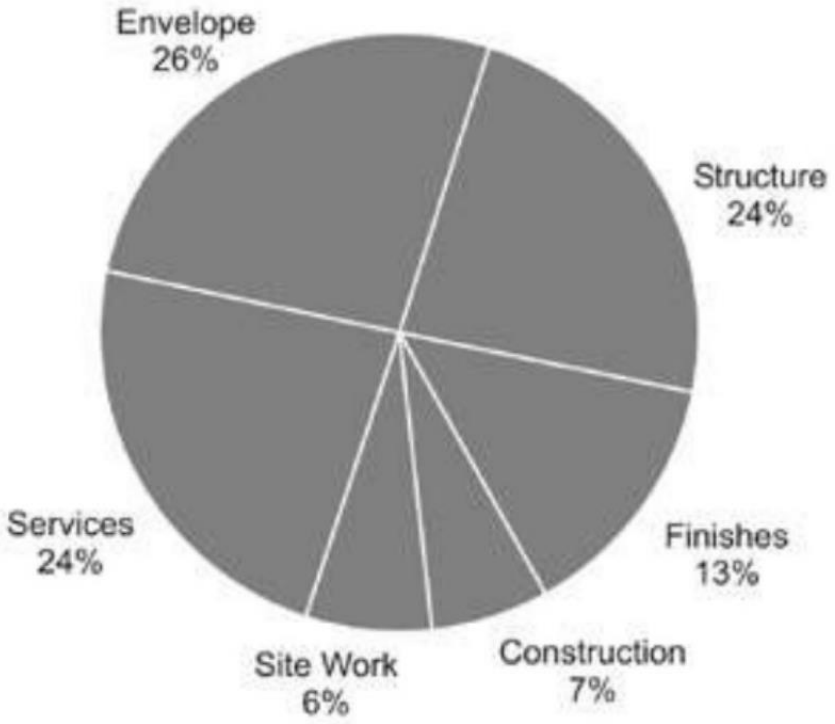
Building Summary

The building construction includes cast metal, steel and wood structural elements, load bearing brick masonry walls and wood and metal framed windows. The building is rectangular in plan and has four floors, with a full basement. The East wall of the building butts up against the adjacent building. The north and west elevations face main streets, and the south elevation faces a laneway.

Heritage Restoration Summary of Work:

- Minimal exterior cladding repair work (done prior to CHIF project – in good condition);
- New insulation (to achieve R20 – reported spray polyurethane), air barrier, vapour barrier and interior finish;
- All mechanical systems removed, new plumbing air handling, air conditioning and heating (LEED and CBIP);
- Significant structural upgrades, including repair/replacement of structural steel columns, beams and joists, and new piles for electrical transformer;
- New windows (with IG units) installed on the interior (wood frame, IG units in most locations, triple glazing on south elevation), leaving older exterior windows intact (includes original metal frame windows with single glazed, wired glass; newer wood frame windows with IG units; and original wood framed windows with single glazing)
- Windows at grade — from renovation circa the 1990's — include aluminum framed windows with IG units, which appear to have warm edge spacer;

How much embodied energy is typically found in buildings?



Average Total Initial Embodied Energy 4.82 GJ/m^2

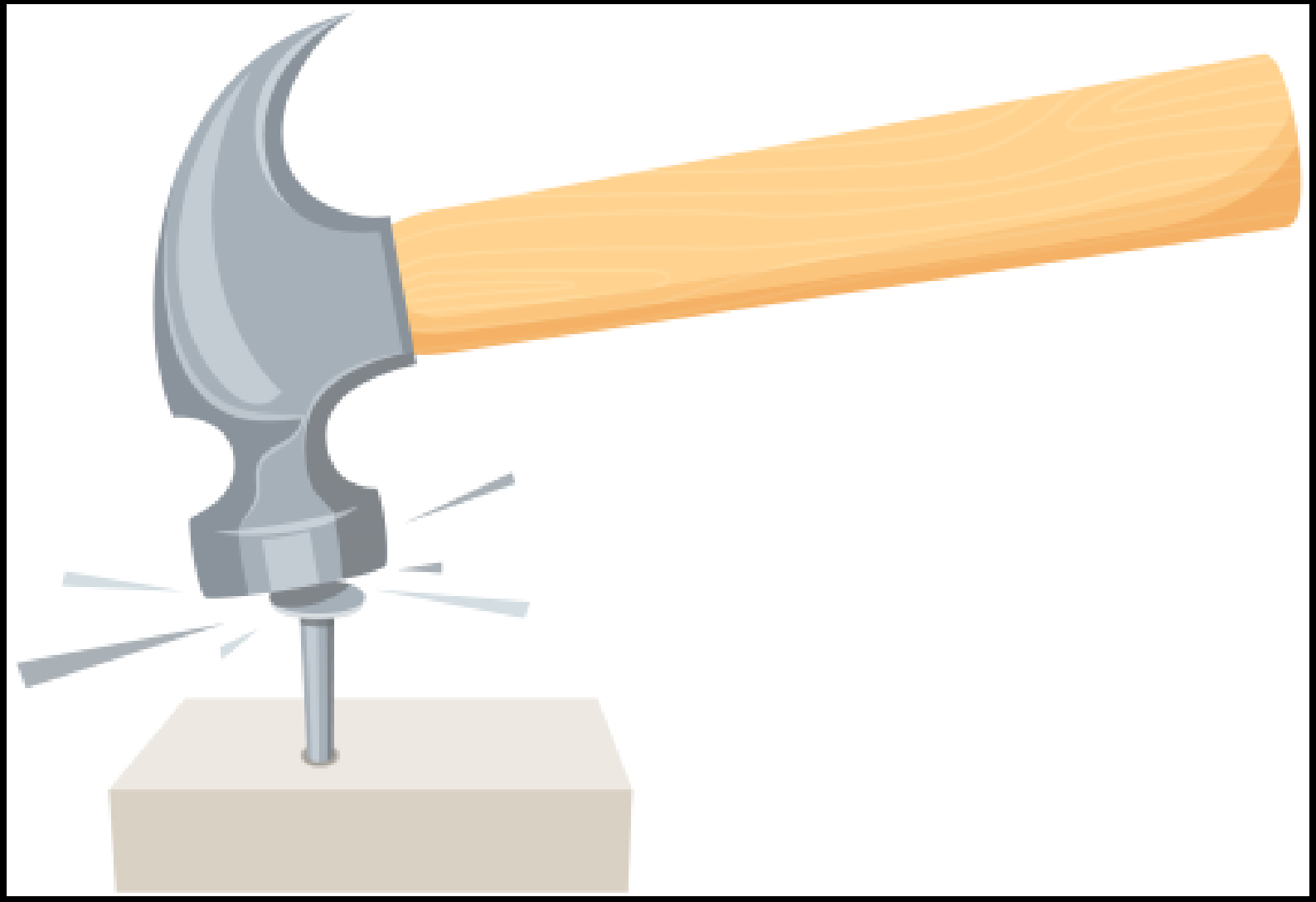
EVERYONE TARGETS THE WINDOWS…

… BUT VINYL IS NOT FINAL

SOLUTIONS?
STOP DOING THE SAME THING…

… STOP TRYING TO MAKE AN EXISTING SITUATION FIT AN IMPOSED FRAMEWORK

… AND DEVELOP NEW TOOLS THAT FIT THE EXISTING SITUATION…



… AND ARE PERFORMANCE-BASED

“first and foremost, the performance approach is the practice of thinking and working in terms of ends rather than means. It is concerned with what a building or building product is required to do, and not with prescribing how it is to be constructed”

[International Council for Building W60 Commission]

SOLUTIONS: BUILDING CODES

- Existing and heritage buildings will never fully conform to existing codes, so stop trying.
- Recognize inherent performance capacity, and make existing situations safer and better.
- Develop Building Codes that deal specifically with the rehabilitation of existing and heritage buildings that will be:
  - easier and less costly to achieve
  - promote investment in aging building stock
  - provide incentives to rehabilitate at no additional public cost

- Home
- About DCA
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  - Codes & Standards
    - About the Director
    - Bureaus, Offices & Programs
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  - Local Government Services
  - Sandy Recovery Division
  - Office of Local Planning Services

Home > Divisions & Offices > Codes & Standards > Bureaus, Offices & Programs > Office of the Director > Rehabilitation Subcode

Rehabilitation Subcode

- Office of the Director
- Bureau of Construction Project Review
- Office of Regulatory Affairs
- Bureau of Homeowner Protection
- Bureau of Housing Inspection
- Bureau of Rooming and Boarding House Standards

Common sense rules for the restoration and re-use of existing buildings in New Jersey.

The Rehabilitation Subcode was developed by the Department of Community Affairs with guidance from a 30-member committee under the coordination of the Center for Urban Policy Research at Rutgers University. The Committee was composed of code officials, fire officials, architects, historic preservationists, advocates for people with disabilities, and government representatives.

The Committee met over two years and approved the draft document at its final meeting on January 31, 1997. Department staff then made the draft a proposal, which was published in the New Jersey Register on August 18, 1997.

Two public hearing were held. Comments were received and discussed and some clarifications and improvements to the proposed document were made. The adoption of the Rehabilitation Subcode was published in the New Jersey Register on January 5, 1998.

The Rehabilitation Subcode is the first comprehensive set of code requirements for existing buildings. It is a stand-alone subchapter and, therefore, it contains all the technical requirements that apply to a rehabilitation project. This is an important concept.





State Historical Building Code (SHBC)

One of California's most valuable tools for the preservation of historic resources is the **California State Historical Building Code** (CHBC), which is defined in **Sections 18950 to 18961 of Division 13, Part 2.7 of Health and Safety Code (H&SC)** Health and Safety Code, a part of **California Law**. The CHBC is intended to save California's architectural heritage by recognizing the unique construction issues inherent in maintaining and adaptively reusing historic buildings. The CHBC provides alternative building regulations for permitting repairs, alterations and additions necessary for the preservation, rehabilitation, relocation, related construction, change of use, or continued use of a "qualified historical building or structure."

Section 18955 of the CHBC defines a "qualified historical building or structure" as "any structure or property, collection of structures, and their associated sites deemed of importance to the history, architecture, or culture of an area by an appropriate local or state governmental jurisdiction. This shall include structures on existing or future national, state or local historical registers or official inventories, such as the National Register of Historic Places, State Historical Landmarks, State Points of Historical Interest, and city or county registers or inventories of historical or architecturally significant sites, places, historic districts, or landmarks. This shall also include places, locations, or sites identified on these historical registers or official inventories and deemed of importance to the history, architecture, or culture of an area by an appropriate local or state governmental jurisdiction."

The CHBC's standards and regulations are intended to facilitate the rehabilitation or change of occupancy so as to preserve their original or restored elements and features, to encourage energy conservation and a cost effective approach to preservation, and to provide for reasonable safety from fire, seismic forces or other hazards for occupants and users of such buildings, structures and properties and to provide reasonable availability and usability by the physically disabled.

Related Pages

Architectural Review

Best Practices Discussion

Federal Historic Preservation Tax Credits Benefit California

Certified California Tax Incentive Projects

Certified Districts

Federal Historic Preservation Tax Incentives Program

Federal Tax Deductions - Easements

Mills Act Program

State Historical Building Safety Board

BY-LAW NO. 10908

A By-law to regulate the construction of buildings and related matters and to adopt the British Columbia Building Code

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

SECTION 1
ADOPTION OF BUILDING CODE AND INTERPRETATION

Adoption of Building Code

1.1 Council adopts the British Columbia Building Code (the "Building Code") established under Ministerial Order No. M188/2012 as the British Columbia Building Code Regulation, B.C. Reg 264/2012, including all subsequent amendments, and incorporates the Building Code into this By-law to the extent and subject to the changes set out in this By-law.

Name of By-law

1.2 The name of this By-law, for citation, is the "Building By-law".

Table of contents

1.3 The table of contents for this By-law is for convenient reference only, and is not for use in interpreting or enforcing this By-law.

Section 11.3 Alternative Acceptable Solutions for Existing Conditions to Assist Rehabilitation

11.3.1. Application

11.3.1.1. Application of Alternative Acceptable Solutions for Existing Conditions

1) Except as permitted in Sentence (3), the alternative *acceptable* solutions provided in this Section are to be applied to existing conditions only and are not to be applied to new work which must comply with the requirements for new construction in other Parts of this By-law.

2) Where the *building* is a *heritage building*, the alternative *acceptable* solutions in Section 11.5 may be applied to existing conditions.

Section 11.5 Alternative Acceptable Solutions for Heritage Buildings

11.5.1. Application

11.5.1.1. Alternative Acceptable Solutions

1) This Subsection provides alternative *acceptable* solutions for the restoration and rehabilitation of *heritage buildings*.

2) The alternative *acceptable* solutions provided in Table 11.5.1.1. apply to existing conditions only and do not apply to new work which must conform to the requirements for new construction in other Parts of this By-law.

Table 11.5.1.1.
Alternate Acceptable Solutions for Heritage Buildings

No.	By-law Requirement	Alternate Compliance Method
1	**Fire Separations** 3.1.3.1.(1) and Table 3.1.3.1.; 9.10.9. 2 h *fire separation* required between some major *occupancies*.	Except for F1 *occupancies*, 1 h *fire separation* is *acceptable*, if the *building* is *sprinklered*.
2	**Fire Separations** 3.1.3.1.(1) and Table 3.1.3.1.; 9.10.9. 1 h *fire separation* required between some major *occupancies*.	1/2 h *fire separation* is *acceptable* if the *building* is *sprinklered*.

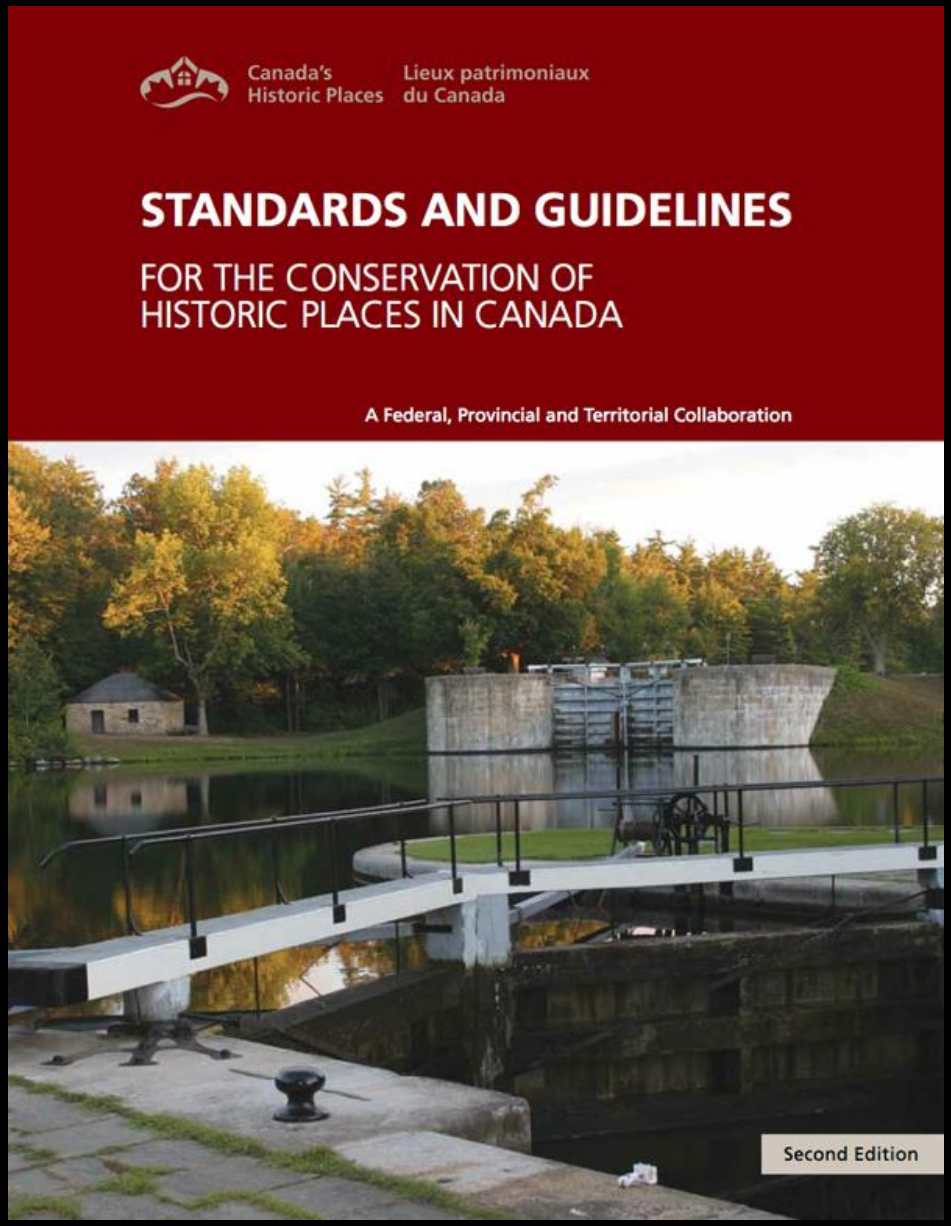
ISSUES: ALTERNATE COMPLIANCE

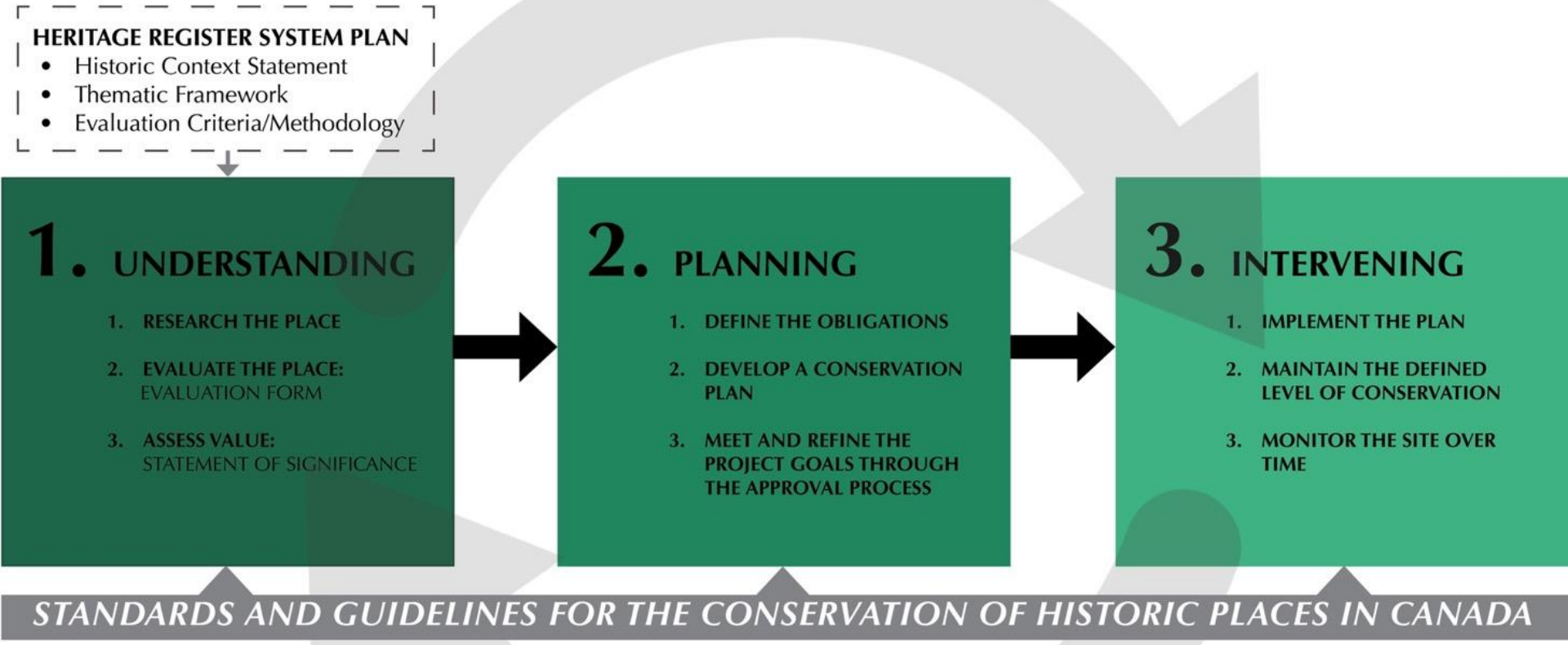
- There are still areas of conflict where the application of Alternative Acceptable Solutions must be interpreted, sometimes by Building Inspectors and sometimes onsite in the middle of construction.
- There are no effective measures that provide alternate compliance for envelope issues.
- Its easier for everyone to say ‘NO’ due to risk, liability and litigation.

ISSUES: HERITAGE BUILDINGS

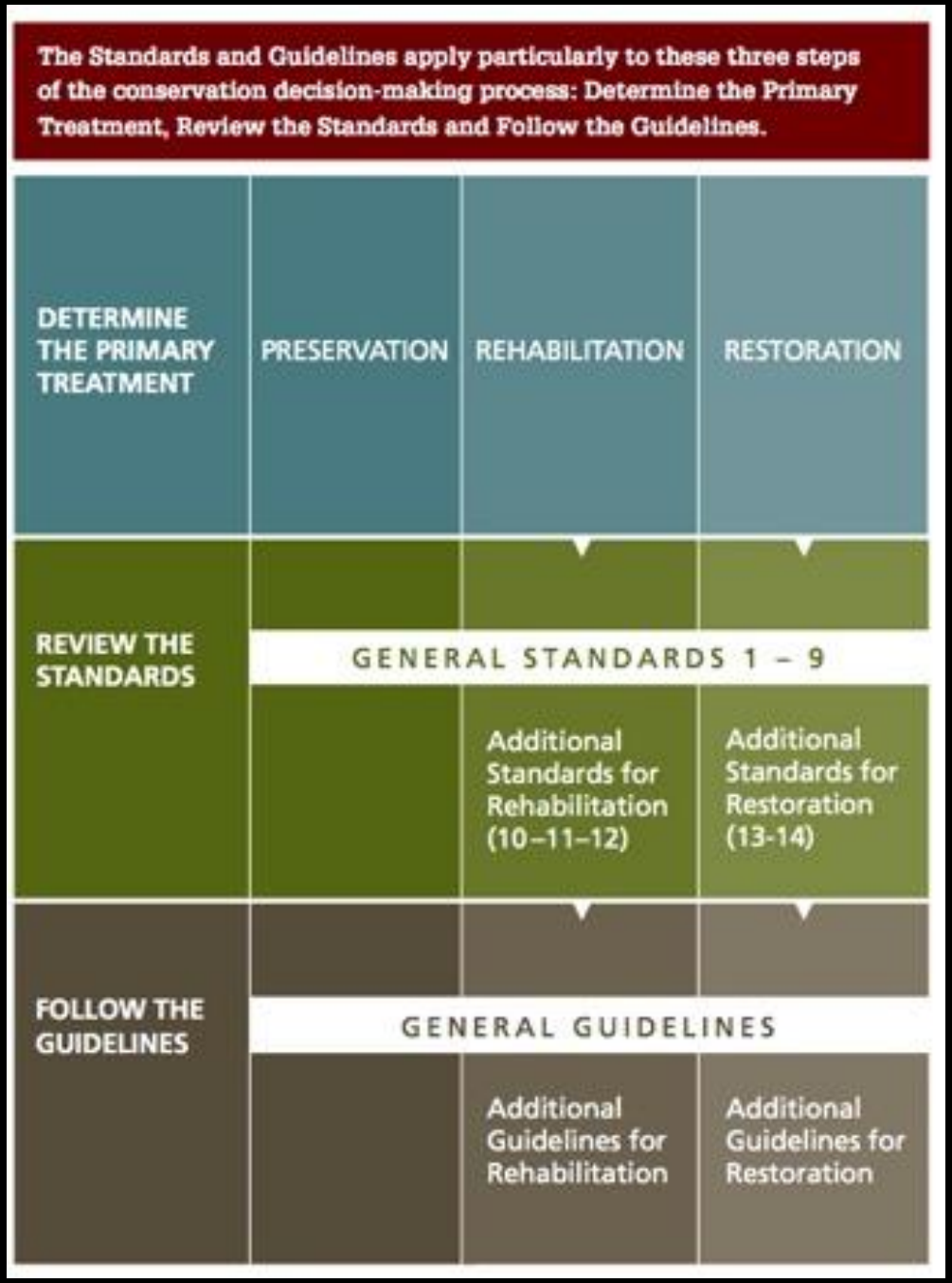
- It becomes even more difficult to resolve Building Code and Specification issues in heritage situations, due to the need to conserve heritage character-defining elements.
- Additional *Standards and Guidelines* apply to heritage conservation, adding another layer of complexity.
- Intent for minimal intervention.
- ‘Do as much as you need to, but as little as possible.’

STANDARDS AND GUIDELINES





Restoration **Preservation** **Rehabilitation**


The Standards and Guidelines apply particularly to these three steps of the conservation decision-making process: Determine the Primary Treatment, Review the Standards and Follow the Guidelines.
DETERMINE THE PRIMARY TREATMENT
PRESERVATION
REHABILITATION
RESTORATION
REVIEW THE STANDARDS
GENERAL STANDARDS 1 – 9
Additional Standards for Rehabilitation (10–11–12)
Additional Standards for Restoration (13-14)
FOLLOW THE GUIDELINES
GENERAL GUIDELINES
Additional Guidelines for Rehabilitation
Additional Guidelines for Restoration

THE STANDARDS

NINE STANDARDS FOR ALL HERITAGE PROJECTS

1. *Conserve the heritage value of a historic place. Do not remove, replace, or substantially alter its intact or repairable character-defining elements. Do not move a part of a historic place if its current location is a character-defining element.*
2. *Conserve changes to a historic place, which over time, have become character-defining elements in their own right.*
3. *Conserve heritage value by adopting an approach calling for minimal intervention.*
4. *Recognize each historic place as a physical record of its time, place and use. Do not create a false sense of historical development by adding elements from other historic places or other properties or by combining features of the same property that never coexisted.*
5. *Find a use for a historic place that requires minimal or no change to its character-defining elements.*

THE STANDARDS

NINE STANDARDS FOR ALL HERITAGE PROJECTS

6. *Protect and, if necessary, stabilize a historic place until any subsequent intervention is undertaken. Protect and preserve archaeological resources in place. Where there is potential for disturbance of archaeological resources, take mitigation measures to limit damage and loss of information.*
7. *Evaluate the existing condition of character-defining element to determine the appropriate intervention needed. Use the gentlest means possible for any intervention. Respect heritage value when undertaking an intervention.*
8. *Maintain character-defining elements on an ongoing basis. Repair character-defining element by reinforcing the materials using recognized conservation methods. Replace in kind any extensively deteriorated or missing parts of character-defining elements, where there are surviving prototypes.*
9. *Make any intervention needed to preserve character-defining elements physically and visually compatible with the historic place and identifiable upon close inspection. Document any intervention for future reference*.

PRESERVATION

The action or process of protecting, maintaining, and/or stabilizing the existing materials, form, and integrity of a *historic place* or of an individual component, while protecting its historic value.

STANDARDS 1 TO 9 APPLY

REHABILITATION

The action or process of making possible a continuing or compatible contemporary use of a *historic place* or an individual component, through repair, alterations, and/or additions, while protecting its heritage value.

THREE ADDITIONAL STANDARDS RELATING TO REHABILITATION

10. *Repair rather than replace character-defining elements. Where character-defining elements are too severely deteriorated to repair, and where sufficient physical evidence exists, replace them with new elements that match the forms, materials and detailing of sound versions of the same elements. Where there is insufficient physical evidence, make the form, material and detailing of the new elements compatible with the character of the historic place.*

11. *Conserve the heritage value and character-defining elements when creating any new additions to a historic place and any related new construction. Make the new work physically and visually compatible with, subordinate to and distinguishable from the historic place.*

12. *Create any new additions or related new construction so that the essential form and integrity of a historic place will not be impaired if the new work is removed in the future.*

RESTORATION

The action or process of accurately revealing, recovering or representing the state of a historic place or of an individual component, as it appeared at a particular period in its history, while protecting its heritage value.

TWO ADDITIONAL STANDARDS RELATING TO REHABILITATION

13. *Repair rather than replace character-defining elements from the restoration period. Where character-defining elements are too severely deteriorated to repair and where sufficient physical evidence exists, replace them with new elements that match the forms, materials and detailing of sound versions of the same elements.*

14. *Replace missing features from the restoration period with new features whose forms, materials and detailing are based on sufficient physical, documentary and/or oral evidence.*

4.3 GUIDELINES FOR BUILDINGS

Buildings illustrate the evolution of Canadian architecture in terms of their form and setting and their assemblies, systems and materials. Buildings can express cultural, regional, local or individual uses, or construction practices, and embody meanings that evolve over time.

The broad range of buildings that are considered historic varies from modest to monumental, ancient to recent, and private to public. Buildings in a heritage district, or in a complex of buildings, may not be formally recognized individually, but may be recognized as contributing to the larger historic place. There is no typical historic building. Each is valued for its own reasons and faces its own challenges.

Buildings can represent identifiable expressions of one or more of the many different cultural, religious or interest groups that make up Canada's multicultural population. They can also be designated because they demonstrate an appropriate and/or innovative response to their climate and setting. Often the heritage value of a building, or group of buildings, illustrates a specific phase, or various phases, in the development of a particular building type, style or aesthetic. Some buildings are historic places because of their association with a particular person, event, theme or achievement.

These guidelines provide general recommendations appropriate to all types of buildings. However, because buildings can also be part of cultural landscapes, engineering works and archaeological sites, those guidelines should be consulted when appropriate. Also refer to the Guidelines for Materials that include traditional as well as modern building and finishing materials.

A building's setting can be as important to its interpretation and understanding of a historic place as is the structure itself. A train station moved away from its tracks is clearly out of context. A lighthouse is equally connected to its setting. The character-defining elements of the Head Harbour Light Station in New Brunswick includes all of the 3,000 square metres of the rocky outcropping and two nearby rocks as well as the five buildings on the site.

BALANCING CONSERVATION PRINCIPLES AND SUSTAINABILITY OBJECTIVES

Both heritage conservation and sustainability aim to conserve. In the case of heritage buildings, this includes considering the inherent performance and durability of their character-defining assemblies, systems and materials, and the minimal interventions required to achieve the most effective sustainability improvements. For example, it may be possible to improve the energy efficiency of an historic building by insulating the attic and basement rather than removing or concealing character-defining brick or plaster to insulate the walls.

BUILDING RESILIENCE

- Developed as a companion document to the *Standards and Guidelines*.
- Building Conservation is a crucial contributor to sustainability because it fulfills the interrelated economic, cultural, social and environmental principals of sustainable development.

www.buildingresiliance.ca

BUILDING RESILIENCE

- Consumed by Canadian Buildings:
  - 33% of energy produced
  - 50% of natural resources
  - 12% of water usage (excluding industry)
- Generated by Canadian Buildings:
  - 25% of landfill waste
  - 10% of airborne particulates
  - 35% of greenhouse gases

BUILDING RESILIENCE

PRACTICAL GUIDELINES FOR THE SUSTAINABLE REHABILITATION OF BUILDINGS IN CANADA

FIRST EDITION

FEDERAL PROVINCIAL TERRITORIAL
HISTORIC PLACES COLLABORATION

TABLE OF CONTENTS

SECTION 3 BUILDING COMPONENT GUIDELINES

SECTION 4 FURTHER INFORMATION

APPENDICES

3.5 STRUCTURAL SYSTEMS

FROM THE STANDARDS AND GUIDELINES
The SGCHPC provides structural advice that may be useful and applicable in older buildings regardless of heritage value. (Ref. pp 174 to 180).

This section is intended to provide guidance for considering sustainable modifications to structural components, particularly when the structural system is identified as a character-defining element of heritage building. *Sustainability* modifications when the structural system is identified as a character-defining element of an historic place. It also gives direction on how to minimize the impact of introducing new elements and intervening in non-character-defining structural systems in a traditional or heritage building.

Structural systems are the primary components that, by meeting user safety and other applicable codes and standards, provide the necessary strength and stiffness to prevent both collapse and unacceptable deformations.

Structural systems can be an interior feature where structural elements are visible. Exposing the structural system can increase spatial volume, provide visual organization, add visual interest, and create material efficiencies (by limiting finish materials). Nevertheless, the visibility and legibility of the structural system should be based on the character of a building; it is not always appropriate to expose a building's structural system.

Rehabilitated long span wood trusses. The timber truss system was repaired by replacing defective or missing members and installing steel plates at connection points. Thus, this significant character-defining element was retained along with the old growth timber. Salt Building, Vancouver, BC. Acton Ostry

CODE ISSUES TO RESOLVE

EXAMPLES:

- Fire Separations
- Interconnected Floor Spaces
- Accessibility
- Egress
- Handrail Heights
- Energy Performance

HANDRAILS:

- The required guard height at landings is 1070 mm, which has been met with upstand extensions.
- The height of the existing handrails is 865 mm. 920 mm is minimum. No extension was provided.

WINDOWS:

- The existing were single-glazed steel windows, not thermally broken
- There was an existing internal system of wooden storm sash.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MANCHESTER: 21 Spring Gardens
Telephone: 4290 Central.

GLASGOW: 134 St. Vincent Street
Telegrams: "Casements, Glasgow." *Telephone: 1540 Argyle.*

ERRATA.

Manchester Telephone No. 4290 *City.*

Pages 10, 11 and 14: For the word "jouis" on bottom line substitute "jambs."

Page 38: Sections of jambs 14 and 13 have been transposed.

HOPE'S SECTION, 6.

Outward Opening Casement with Frame

Tip hung Casement, Quality 1 (for use above transoms), with moulded and rebated bars, and fitted with Hope's Patent Casement Opener.

Side hung Casement, Quality 1, with moulded and rebated bars, fitted with Handle 200 on Plate 190 and Stay 223.

NOTE.—Sections 6 and 60 may have the mouldings on the outside if preferred.

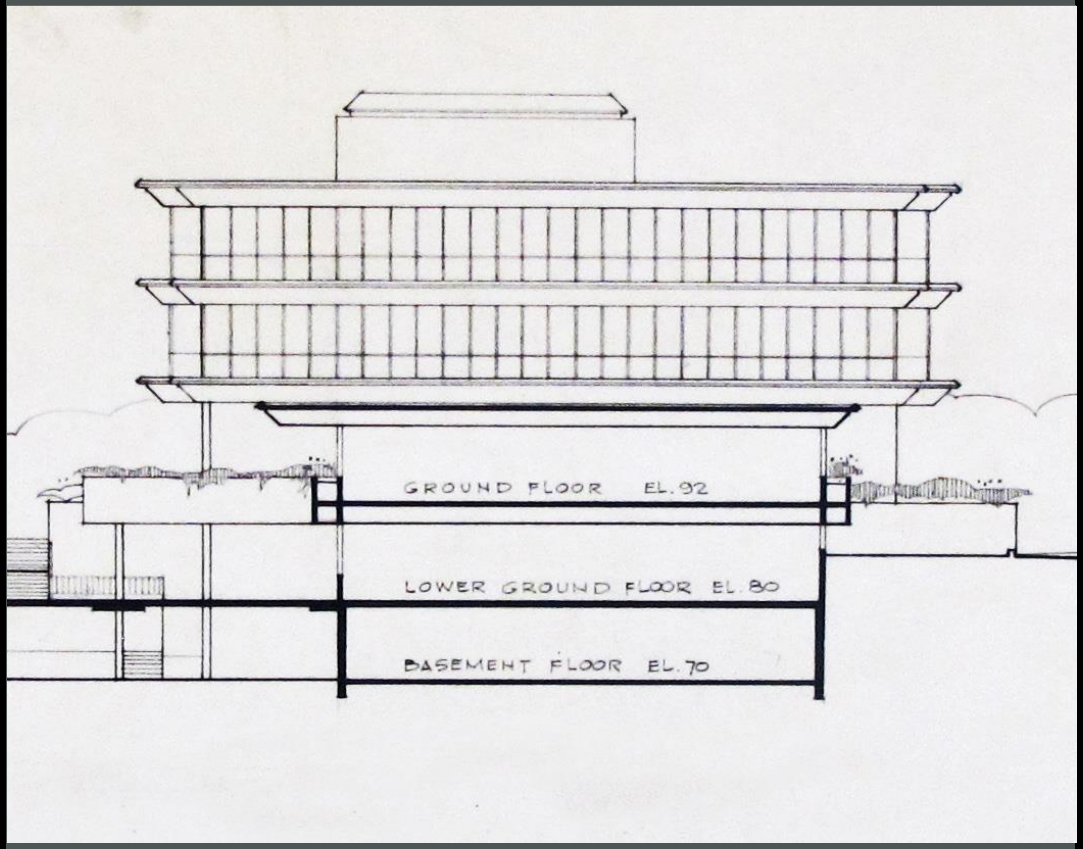
Prices of Section 6 are the same as for Section 2. *See page 19.*


DRO-MOBILE.COM

DISTRICT OF WEST VANCOUVER

MUNICIPAL HALL

CONSERVATION RECOMMENDATIONS



DECEMBER 2011

DONALD LUXTON AND ASSOCIATES INC

DONALD LUXTON AND ASSOCIATES INC.
1030 - 470 GRANVILLE STEET VANCOUVER BC V6C 1V5
info@donaldluxton.com 604 688 1216 www.donaldluxton.com

CONSERVATION: FENESTRATION

Character-Defining Element	Description	Conservation Intervention
3. fenestation: - Windows	- The aluminum windows, including fixed panes and operable jalousies, are set in aluminum frames and were designed as an integral part of the defining curtain wall system.	- Repair if necessary and maintain. Do not replace.
- Spandrels	- The opaque grey glass spandrel panels are located below the windows and help to delineate the horizontal massing of the building.	- Repair if necessary and maintain. Do not replace.
- Screens	- The mesh sunscreens are also part of the curtain wall system.	- Repair if necessary and maintain.

CONSERVATION: INTERIOR

Character-Defining Element	Description	Conservation Intervention
5. Interior - Flooring	- Terrazzo flooring with decorative banding is found on the main floor.	- Repair if necessary and maintain. Do not replace.
- Staircase	- The original concrete 'floating' staircase features an aluminum handrail and balusters.	- Repair if necessary and maintain. Do not replace.
- Doors and Pulls	- Original full-height wooden doors are found throughout the east wing of the main floor. Custom pulls are found on exterior doors.	- Repair if necessary and maintain. Do not replace.
- Skylights	- Decorative opaque circular skylights are located in the Council Chambers, Conference Room and above the staircase.	- Repair if necessary and maintain. Do not replace.
- Signage	- Signage above the elevators and on washroom doors is original.	- Paint and maintain.
- Pillars	- Pillars mimic the plan shape of the west wing on the main floor.	- Paint and maintain.

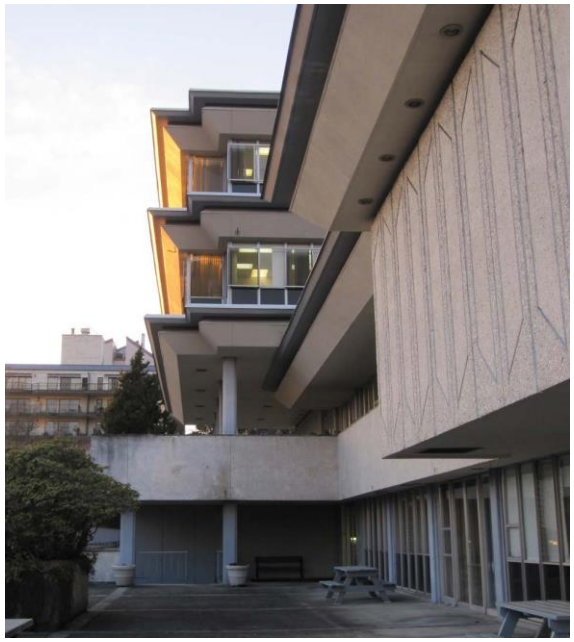
406 – 611 Alexander Street
Vancouver, BC, V6A 1E1
TEL 604.255.1169

300 – 134 11th Avenue SE
Calgary, Alberta, T2G 0X5
TEL 403.245.5501

100 - 10237 104th Street
Edmonton, Alberta T5J 1B1
TEL 780.429.1580

1000 – 2 Bloor Street East
Toronto, Ontario, M4W 1A8
TEL 416.966.0220

DIALOG



West Vancouver

Municipal Hall Upgrades

February, 2018

Project Team:

ARCHITECT
DIALOG

ELECTRICAL
AES Engineering

BUILDING CODE
GHL Consultants Ltd.

STRUCTURAL
Read Jones Christoffersen Ltd.

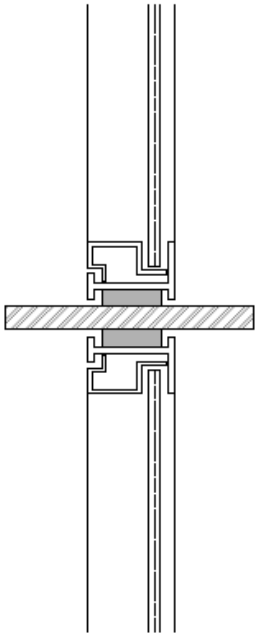
HERITAGE
Donald Luxton & Associates

ELEVATOR
Vertech Elevator Services

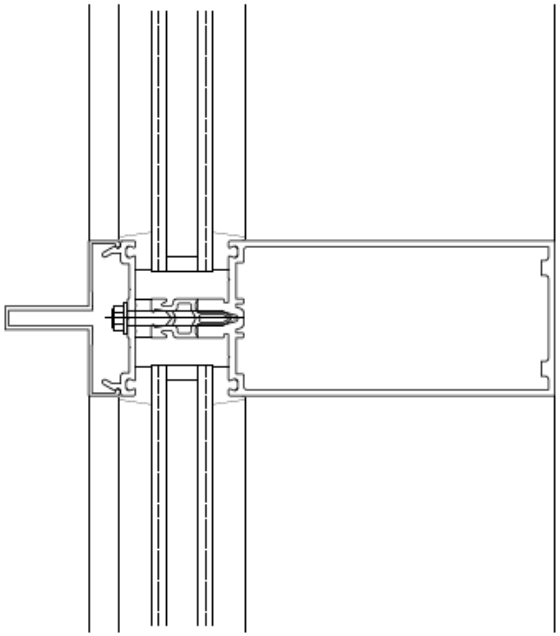
MECHANICAL
DIALOG

BUILDING ENVELOPE
LDR Engineering Group

COSTING
LEC Group



EXISTING TYPICAL
MULLION DETAIL



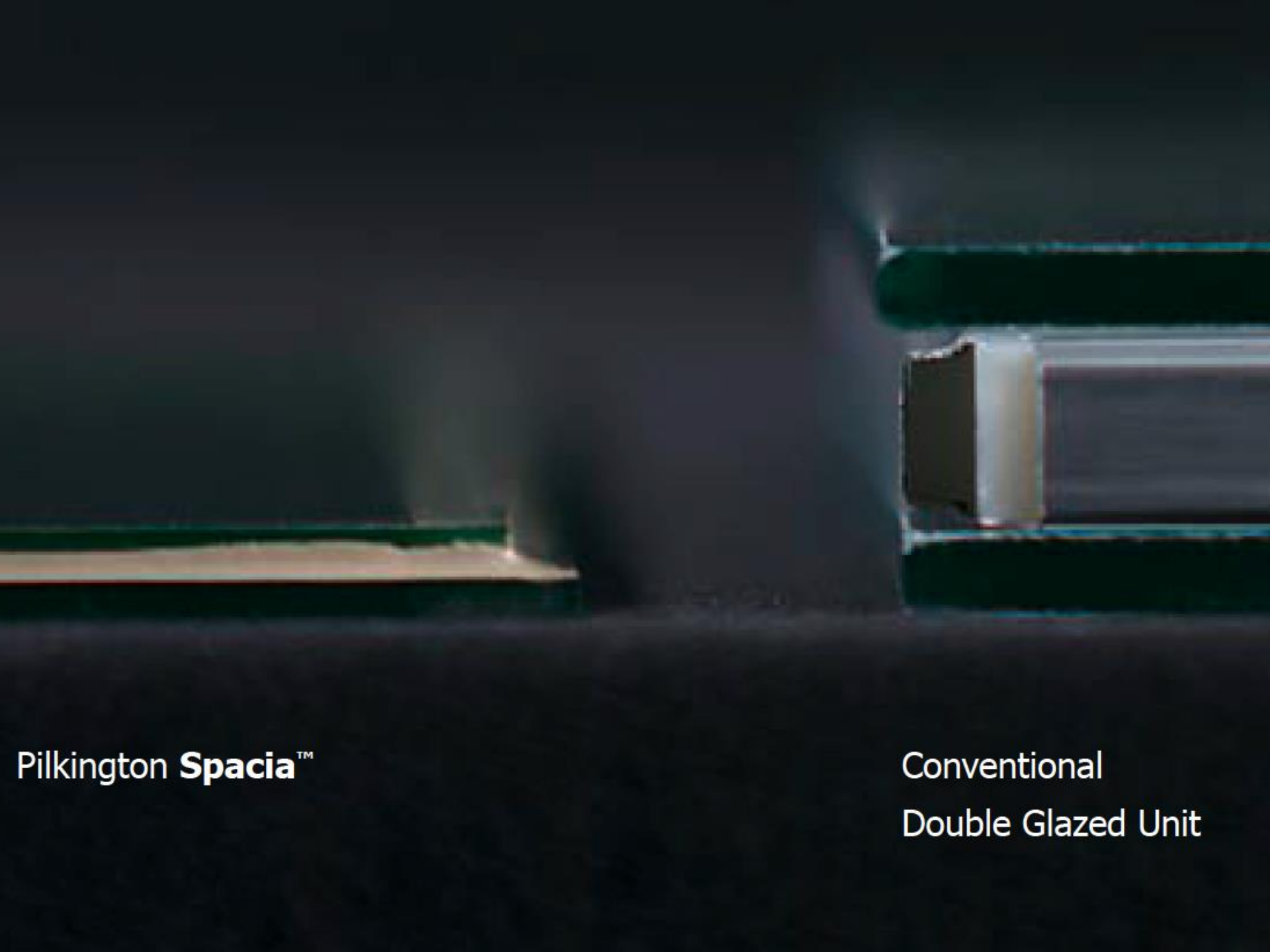
PROPOSED CUSTOM
CURTAINWALL MULLION

WEST VANCOUVER

MUNICIPAL HALL UPGRADES

OCT/17

DIALOG


Pilkington **Spacia**™
Conventional
Double Glazed Unit

Pilkington **Spacia™**

NSG GROUP

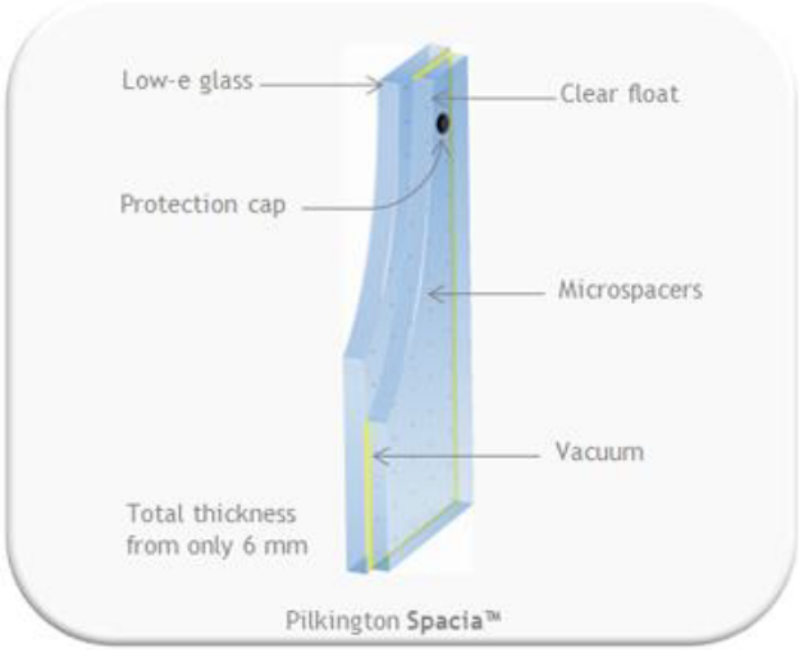
How it Works

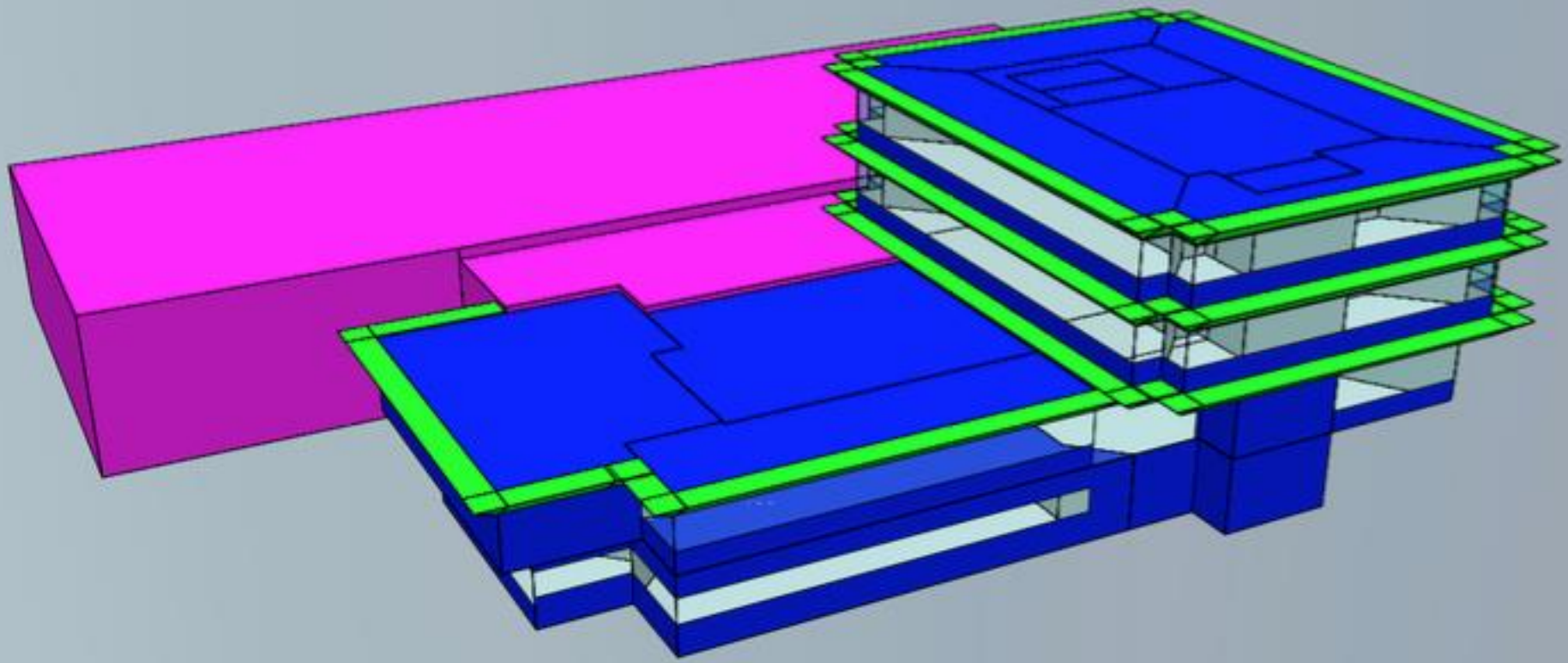
- Air between the two panes of glass is extracted, creating a vacuum.

- A vacuum, even a small one, is much more effective at minimizing conduction and convection heat losses.

- The gap between the two panes can be reduced to just 0.2 mm, giving an overall thickness of just over 6 mm.

- Heat flow through radiation is limited through one of the glass panes having a low-emissivity coating, similar to that used in modern conventional double glazing.





Energy Modelling by Dialog

West Vancouver Municipal Hall

Existing window system:

This is for the typical window module: from the underside of the floor above to the top of the concrete curb, from vertical mullion to vertical mullion, and taking the spandrel panel into account. We calculated an effective overall U-value of 0.889 Btu/hr-sq ft °F.

Component	U	A (ft2)	UA		
COG 1	1.012	10.1729	10.2980		
COG 2	0.568	5.3740	3.0497		
EOG 1	1.009	0.4774	0.4815		
EOG 2	0.985	1.0605	1.0441		
EOG 3	0.985	1.0605	1.0441		
EOG 4	0.934	0.4774	0.4459		
EOG 5	0.934	0.4773	0.4458		
EOG 6	0.985	0.5814	0.5724		
EOG 7	0.985	0.5814	0.5724		
EOG 8	0.062	0.4773	0.0296		
F jamb 1	2.215	1.0600	2.3483		
F jamb 2	0.212	0.6000	0.1274		
F bottom sill	0.270	0.6940	0.1873		
F sill	0.304	0.6940	0.2111		
F head	1.306	0.6940	0.9066		
		24.482	21.764		
			R=	1.125	
			U=	0.889	btu/h

Replace Vision Glass with Pilkington Spacia:

After replacing the single pane of glass with the Pilkington Spacia IGU in the model above, we calculated an overall effective U-value of 0.469 Btu/hr-sq ft °F.

Component	U	A (ft2)	UA		
COG 1	0.188	10.1729	1.9115		
COG 2	0.568	5.3740	3.0497		
EOG 1	0.374	0.4774	0.1785		
EOG 2	0.367	1.0605	0.3888		
EOG 3	0.367	1.0605	0.3888		
EOG 4	0.344	0.4774	0.1644		
EOG 5	0.934	0.4773	0.4458		
EOG 6	0.985	0.5814	0.5724		
EOG 7	0.985	0.5814	0.5724		
EOG 8	0.062	0.4773	0.0296		
F jamb 1	2.234	1.0600	2.3680		
F jamb 2	0.212	0.6000	0.1274		
F bottom sill	0.270	0.6940	0.1873		
F sill	0.304	0.6940	0.2111		
F head	1.268	0.6940	0.8801		
		24.482	11.476		
			R=	2.133	
			U=	0.469	btu/h

WVMHU OUTCOMES

- Energy modelling shows that we can achieve 85% of the performance of a new curtain wall
- Potential cost savings
- Potential of much enhanced lifespan; existing system is 55 years old with no signs of failure; potential attenuated lifespan of VIG units
- Assists in the phased construction schedule
- High level of heritage conservation

LESSONS LEARNED:

- Look for technical solutions
- Insist on mockups and testing
- Don’t take “NO” for an answer

WHAT ARE THE OPPORTUNITIES?

- Training and education throughout the building design and construction sector to better understand the opportunities to introduce sustainable conservation measures.

- Ensure expanded Acceptable Alternate Compliance measures in current and contemplated revisions to VBBL, BCBC and NBC.

- Explore the potential to develop specific Rehabilitation Subcodes for existing and heritage buildings.