City of Vancouver

Presentation to
BCBEC
Annual Conference 2015
Vancouver
September 23, 2015

90.1-2010 and NECB 2011
–
How these energy requirements apply to the
Alterations of Existing Buildings

CITY OF VANCOUVER

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Energy Standards and Codes

BC & City of Vancouver

Energy Standards and Codes

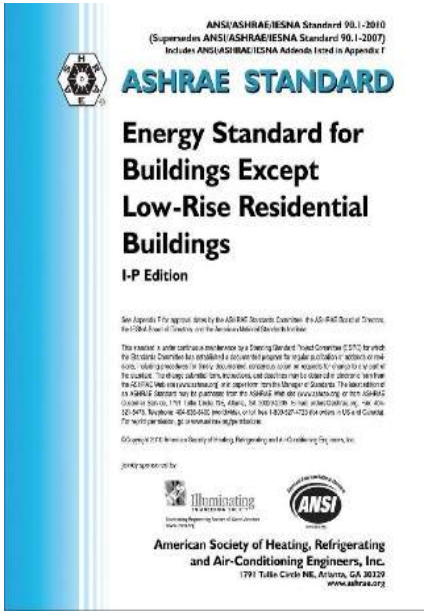
ASHRAE 90.1-2010

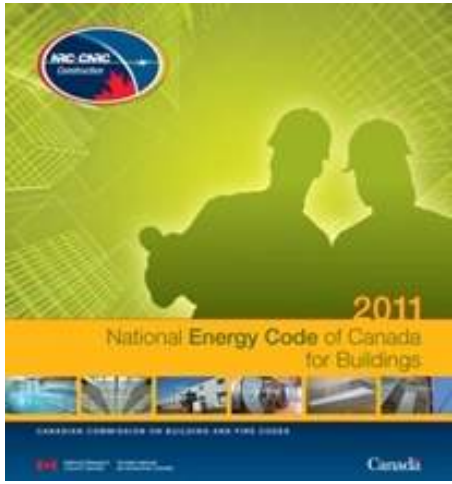
and

NECB 2011

but not 9.36

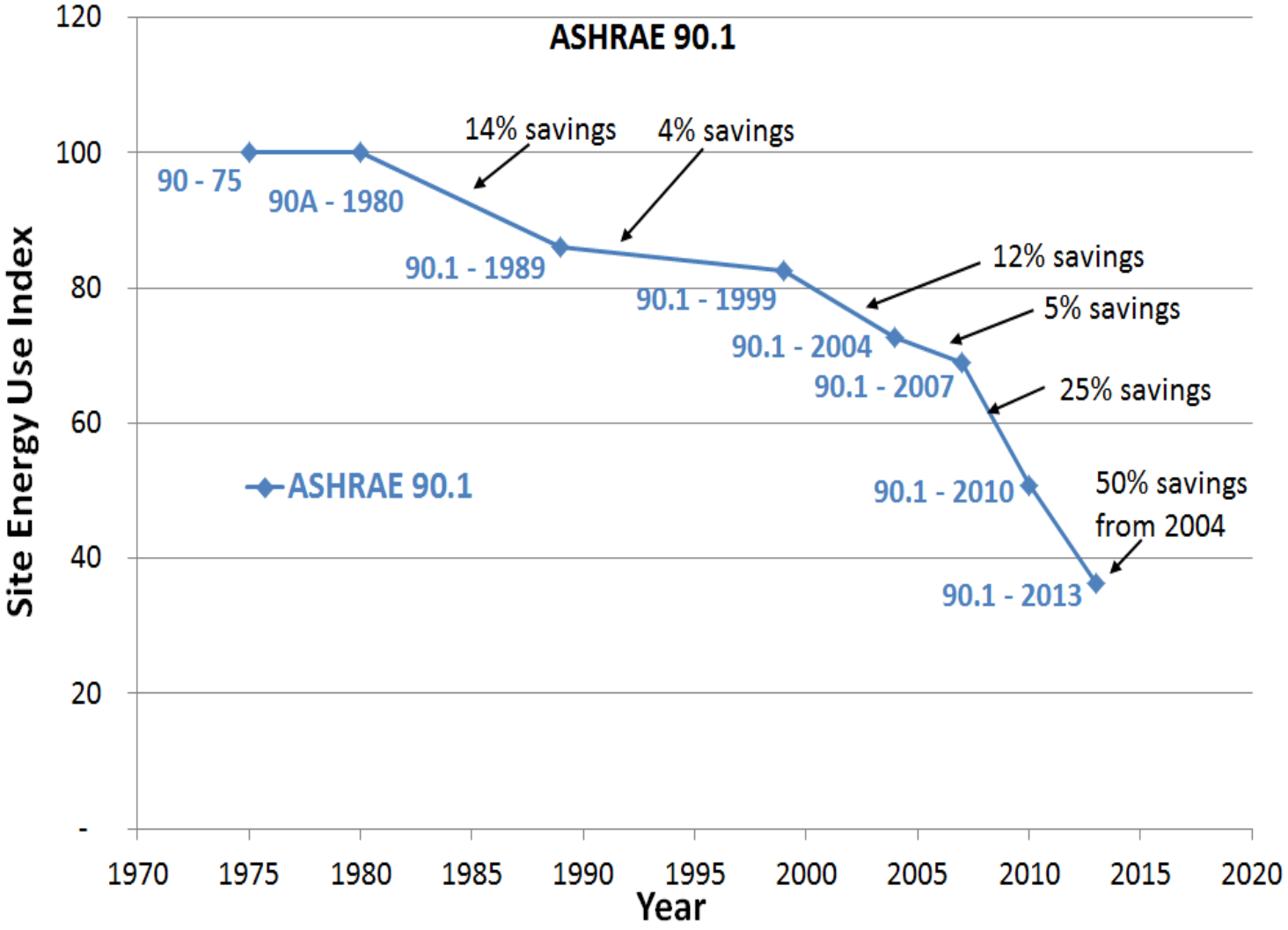
(Vancouver is not adopting 9.36)

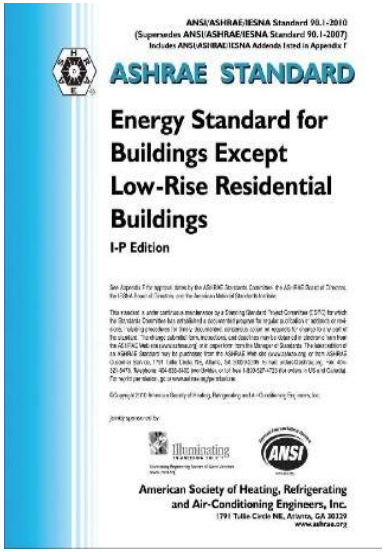




Energy Standards and Codes

ASHRAE 90.1 Standard Evolution

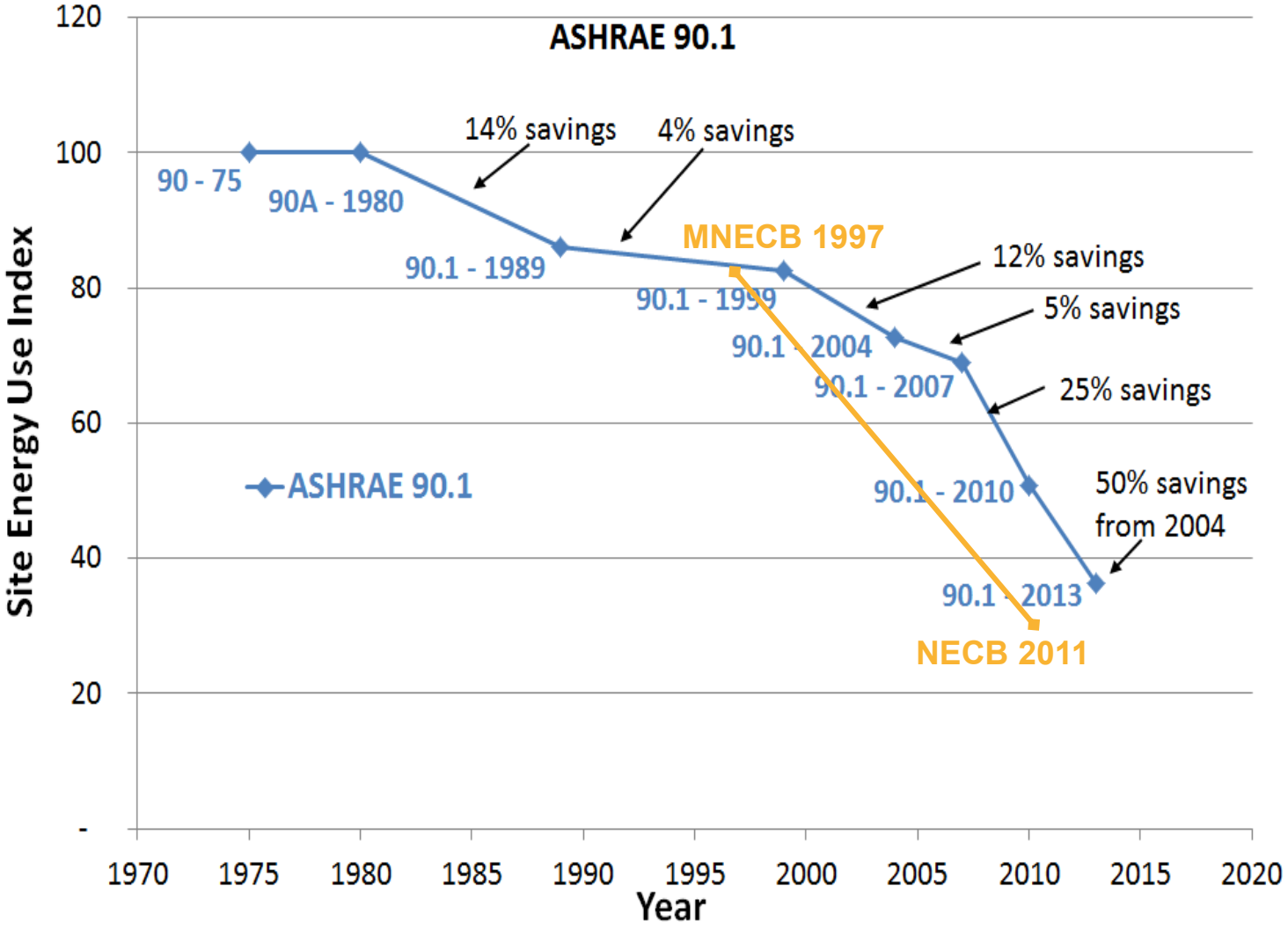


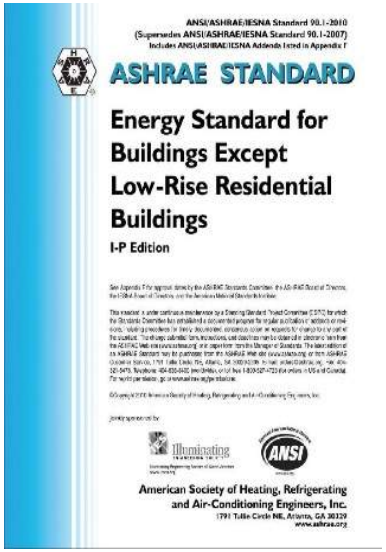


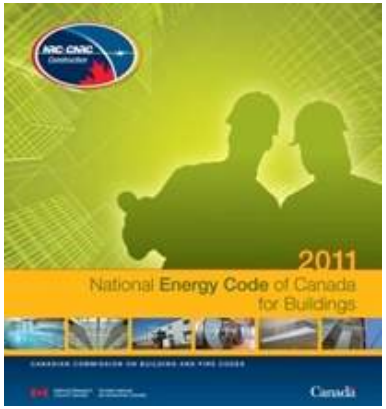
Improvements in stringency from ASHRAE 90-75 to ASHRAE 90.1-2010

Energy Standards and Codes

ASHRAE 90.1 Standard Evolution



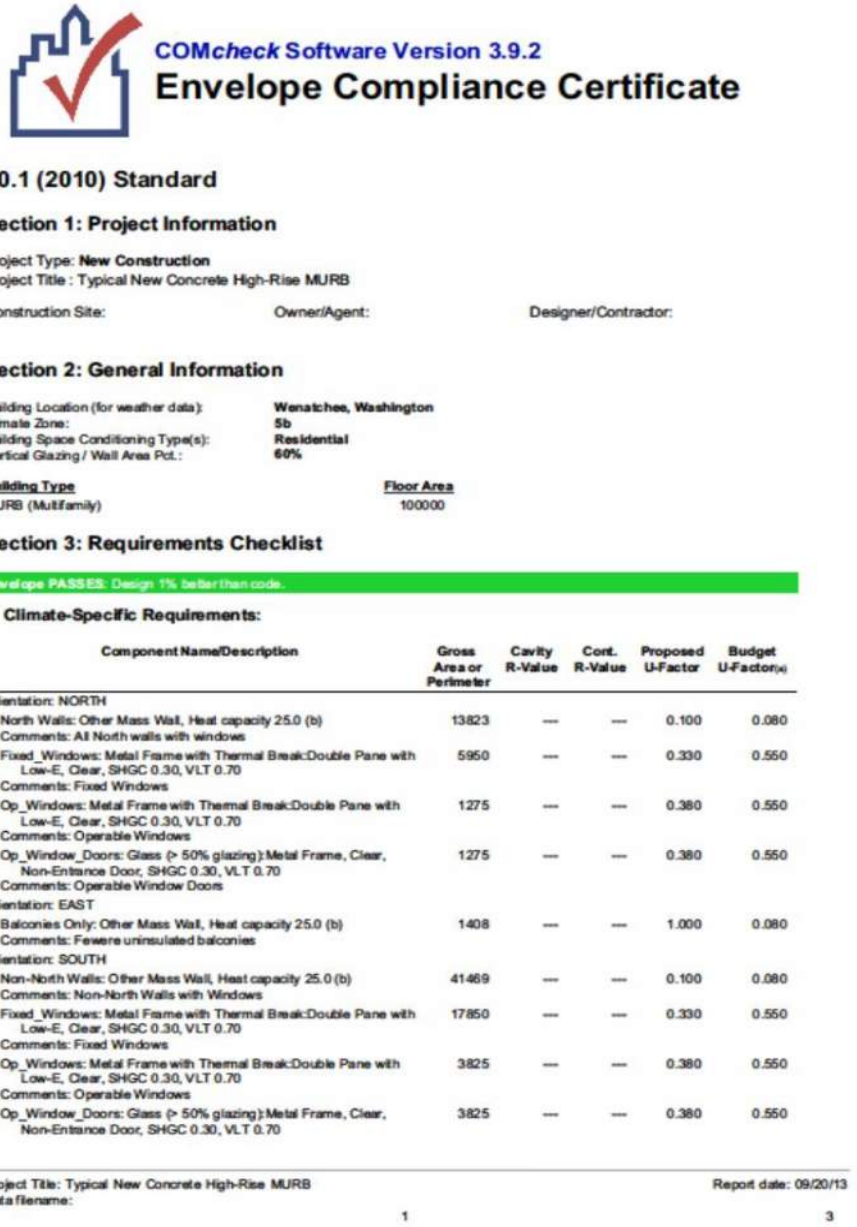




Improvements in stringency from ASHRAE 90-75 to ASHRAE 90.1-2010

Energy Standards and Codes – AHJ-specific

CITY OF VANCOUVER



COMcheck Software Version 3.9.2

Envelope Compliance Certificate

90.1 (2010) Standard

Section 1: Project Information

Project Type: **New Construction**
Project Title : Typical New Concrete High-Rise MURB

Construction Site: Owner/Agent: Designer/Contractor:

Section 2: General Information

Building Location (for weather data):	**Wenatchee, Washington**
Climate Zone:	**5b**
Building Space Conditioning Type(s):	**Residential**
Vertical Glazing / Wall Area Pct.:	**60%**

Building Type	Floor Area
MURB (Multifamily)	100000

Section 3: Requirements Checklist

Envelope PASSES: Design 1% better than code.

Climate-Specific Requirements:

Component Name/Description	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Orientation: NORTH					
North Walls: Other Mass Wall, Heat capacity 25.0 (b) Comments: All North walls with windows	13823	---	---	0.100	0.080
Fixed_Windows: Metal Frame with Thermal Break:Double Pane with Low-E, Clear, SHGC 0.30, VLT 0.70 Comments: Fixed Windows	5950	---	---	0.330	0.550
Op_Windows: Metal Frame with Thermal Break:Double Pane with Low-E, Clear, SHGC 0.30, VLT 0.70 Comments: Operable Windows	1275	---	---	0.380	0.550
Op_Window_Doors: Glass (> 50% glazing):Metal Frame, Clear, Non-Entrance Door, SHGC 0.30, VLT 0.70 Comments: Operable Window Doors	1275	---	---	0.380	0.550
Orientation: EAST					
Balconies Only: Other Mass Wall, Heat capacity 25.0 (b) Comments: Fewere uninsulated balconies	1408	---	---	1.000	0.080
Orientation: SOUTH					
Non-North Walls: Other Mass Wall, Heat capacity 25.0 (b) Comments: Non-North Walls with Windows	41469	---	---	0.100	0.080
Fixed_Windows: Metal Frame with Thermal Break:Double Pane with Low-E, Clear, SHGC 0.30, VLT 0.70 Comments: Fixed Windows	17850	---	---	0.330	0.550
Op_Windows: Metal Frame with Thermal Break:Double Pane with Low-E, Clear, SHGC 0.30, VLT 0.70 Comments: Operable Windows	3825	---	---	0.380	0.550
Op_Window_Doors: Glass (> 50% glazing):Metal Frame, Clear, Non-Entrance Door, SHGC 0.30, VLT 0.70	3825	---	---	0.380	0.550

Project Title: Typical New Concrete High-Rise MURB
Data filename:
Report date: 09/20/13
1
3

COMcheck in BC

(90.1-2010 Building Envelope Trade-off Path)

- In 2013, the BSSB & CoV worked together to add 12 BC weather locations into COMcheck;
  - Victoria, Nanaimo
  - City of Vancouver,
  - Van Lower Mainland (excl Van),
  - Fraser Valley (Abbotsford),
  - Penticton, Cranbrook
  - Kamloops,
  - Prince Rupert, Prince George,
  - Dawson Creek, Fort Nelson
- Outside the CoV, use of COMcheck for BE T/O path is up to the AHJ

Energy Standards and Codes

The BC Energy Efficiency Act

specifically, Part (d) within Sections 17-21,

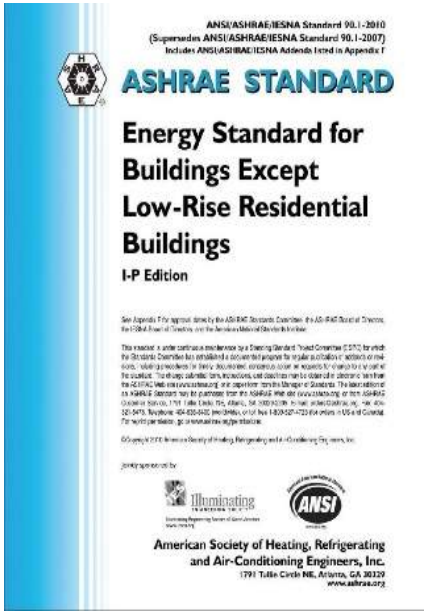
exempts

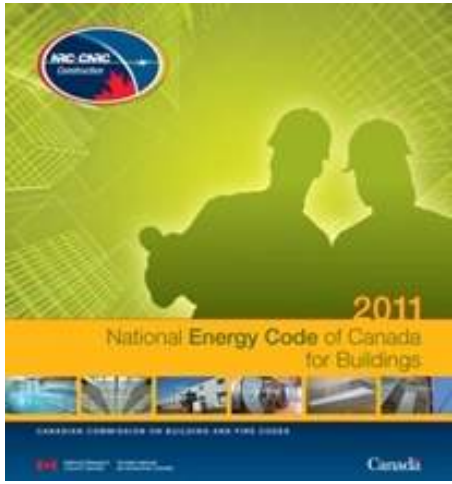
buildings that are designing to and/or complying with either

ASHRAE Standard 90.1-2010

or

NECB 2011

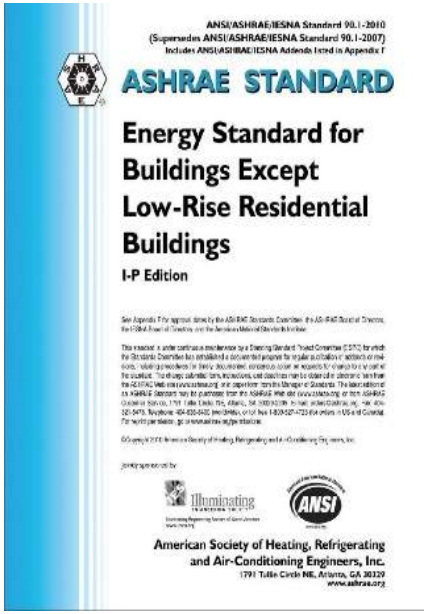


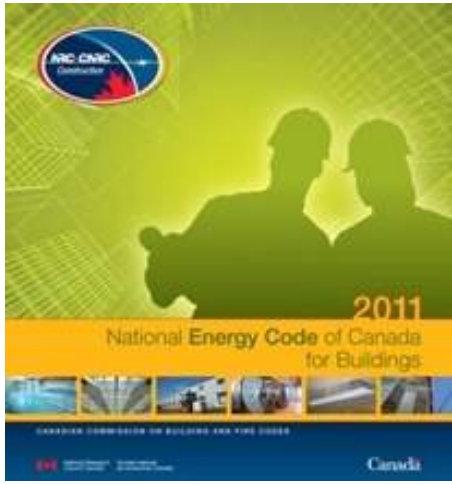


Energy Standards and Codes

Designers cannot mix the sections or methodologies of these two energy documents.

A design team must choose one or the other, and comply on the basis of either the standard or the code, in its entirety.





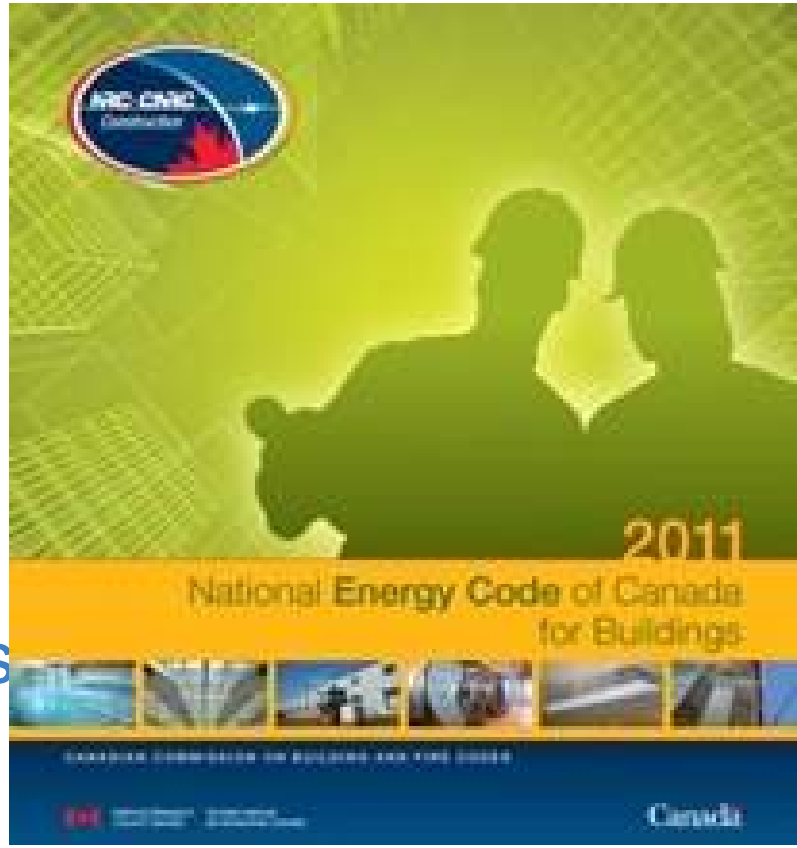
Energy Standards and Codes

Alterations to Existing Buildings

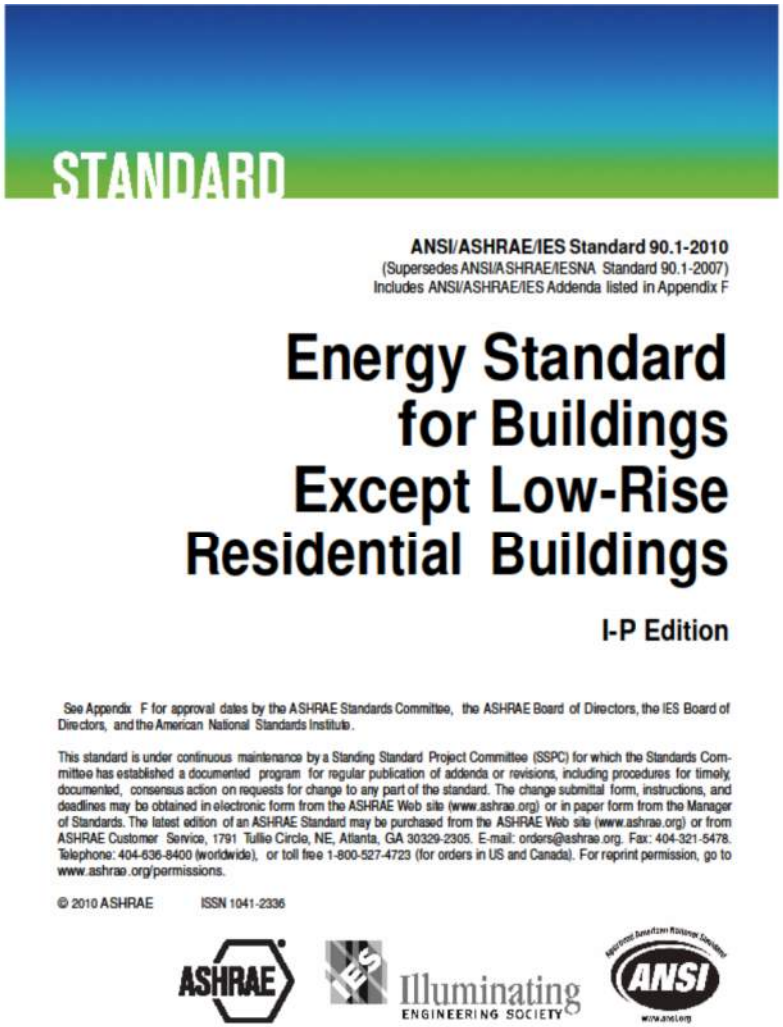
Energy Standards and Codes – Alterations to EB

NECB 2011

- Has no language for retrofitting buildings designed and constructed to NECB 2011
  - This is apparently under consideration
  - The CaGBC (LEED) presently requires alterations to NECB buildings per ASHRAE 90.1-2010



Energy Standards and Codes – Alterations to EB


STANDARD

ANSI/ASHRAE/IES Standard 90.1-2010
(Supersedes ANSI/ASHRAE/IESNA Standard 90.1-2007)
Includes ANSI/ASHRAE/IES Addenda listed in Appendix F

Energy Standard for Buildings Except Low-Rise Residential Buildings

I-P Edition

See Appendix F for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, the IES Board of Directors, and the American National Standards Institute.

This standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE Web site (www.ashrae.org) or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from the ASHRAE Web site (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

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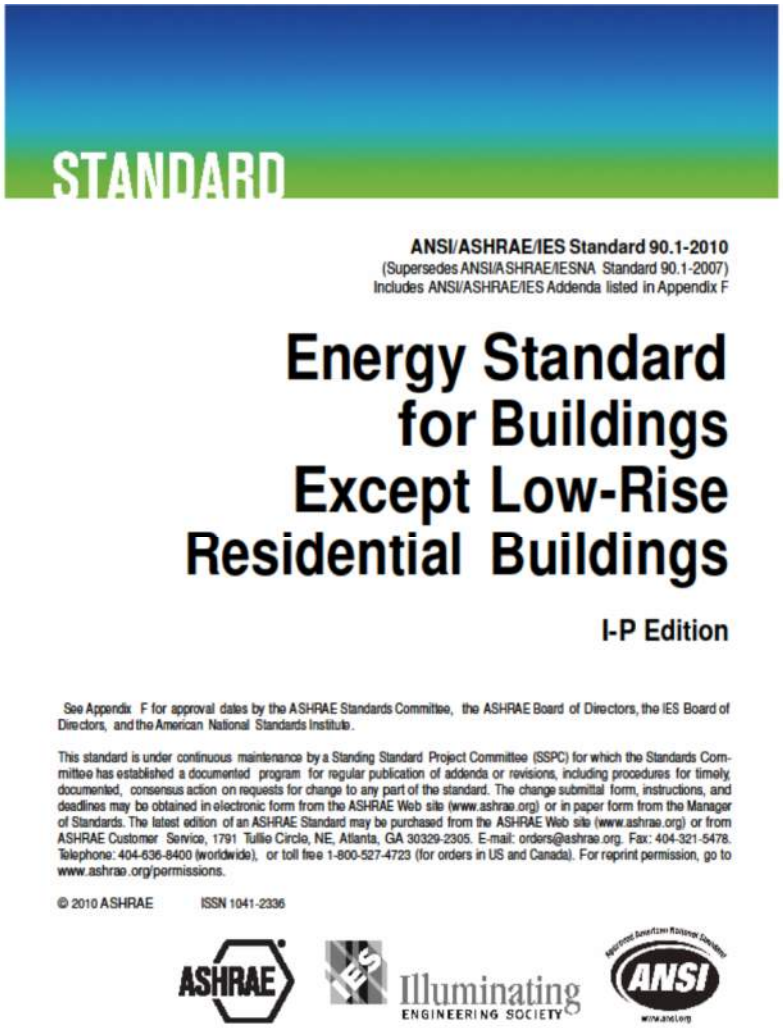
ASHRAE Illuminating ENGINEERING SOCIETY ANSI

90.1-2010

- Some Sections have req'ts for "Additions to Existing Buildings"
  - Ex: HVAC (6.1.1.2)
    and
    SWH (7.1.1.2)

- tie-in with original building system

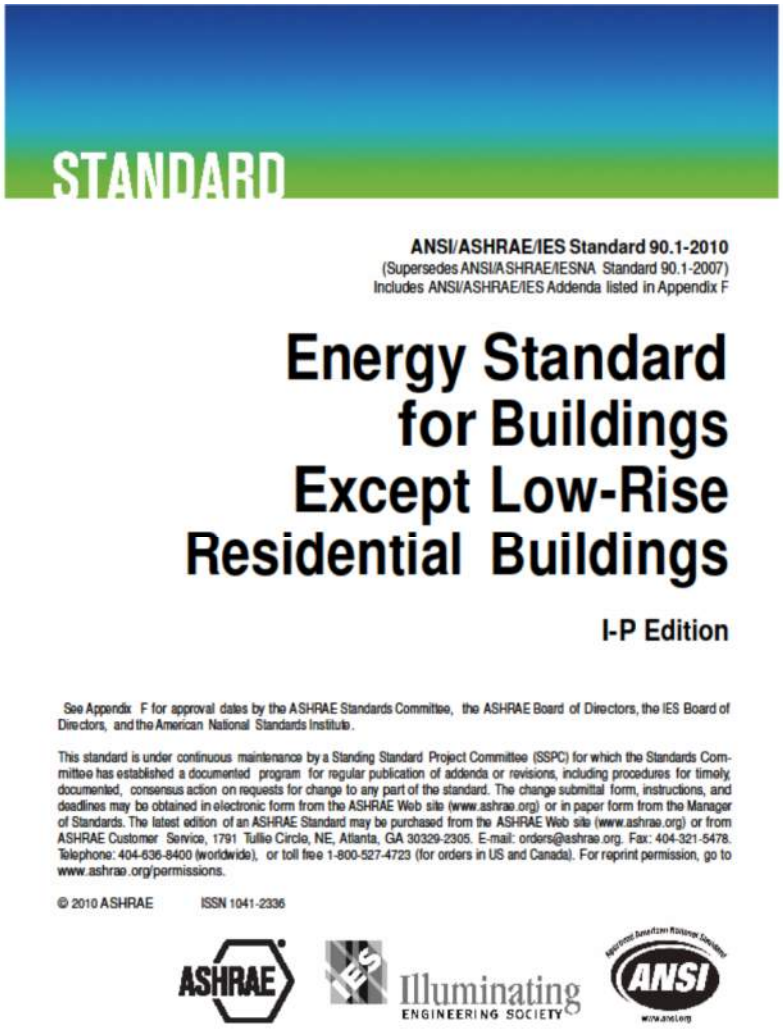
Energy Standards and Codes – Alterations to EB



90.1-2010

- Most Sections have req'ts for "Alterations to Existing Buildings"
  - Basic principle:
    - Alteration does not make building performance worse

Energy Standards and Codes – Alterations to EB



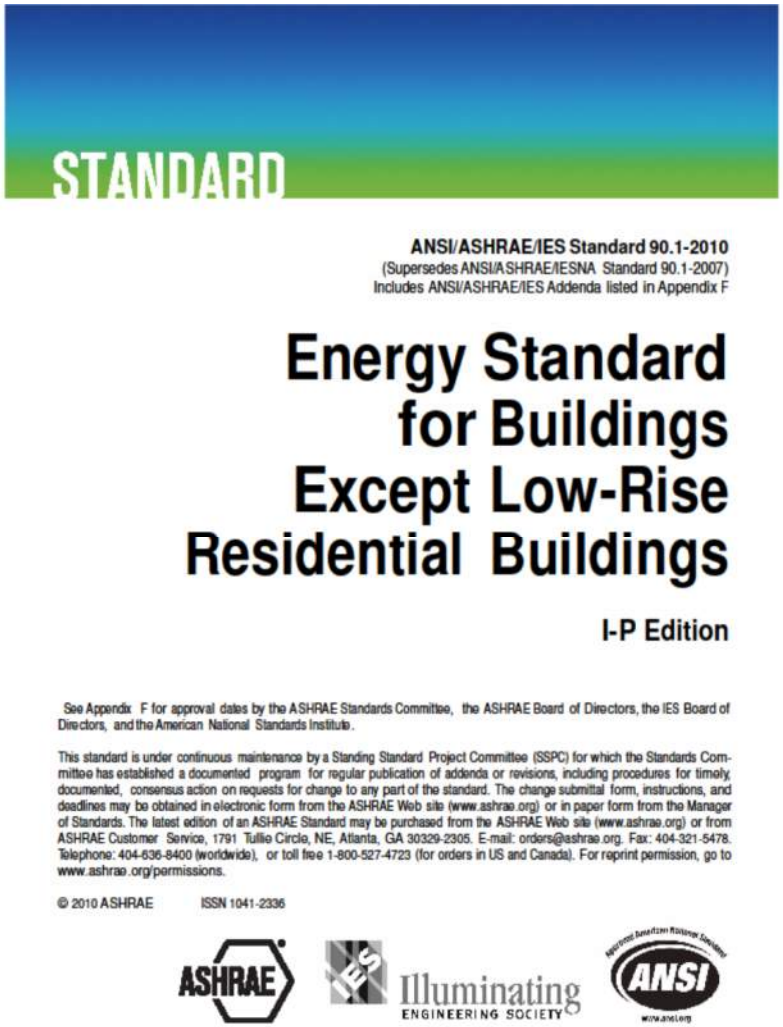
BC (BCBC)

- Alterations to E/B
  - Up to AHJs to enforce

City of Vancouver (VBBL)

- Alterations to E/B
  - Enforced
  - Effective 1/1/15
  - Via energy checklists and ASHRAE compliance docs

Energy Standards and Codes – Alterations to EB



90.1-2010

- ASHRAE's requirements for "Alterations to Existing Building" can be found;
  - Building Envelope (5.1.3)
  - HVAC (6.1.1.3)
  - Service Water Heating (7.1.1.3)
  - Power (N/A)
  - Lighting (9.1.2)

5.1.3 Envelope Alterations

- Alterations to envelope must comply with Section 5
  - Alterations Exceptions:
    - (Must not increase building energy usage),

    a) Addition of storm windows over existing glazing,

    b) Glazing repair (removal, refurbishment, replacement – existing sash and frame),

    c) Repairs to opaque assemblies without cavities, or with fully insulated cavities,

5.1.3 Envelope Alterations

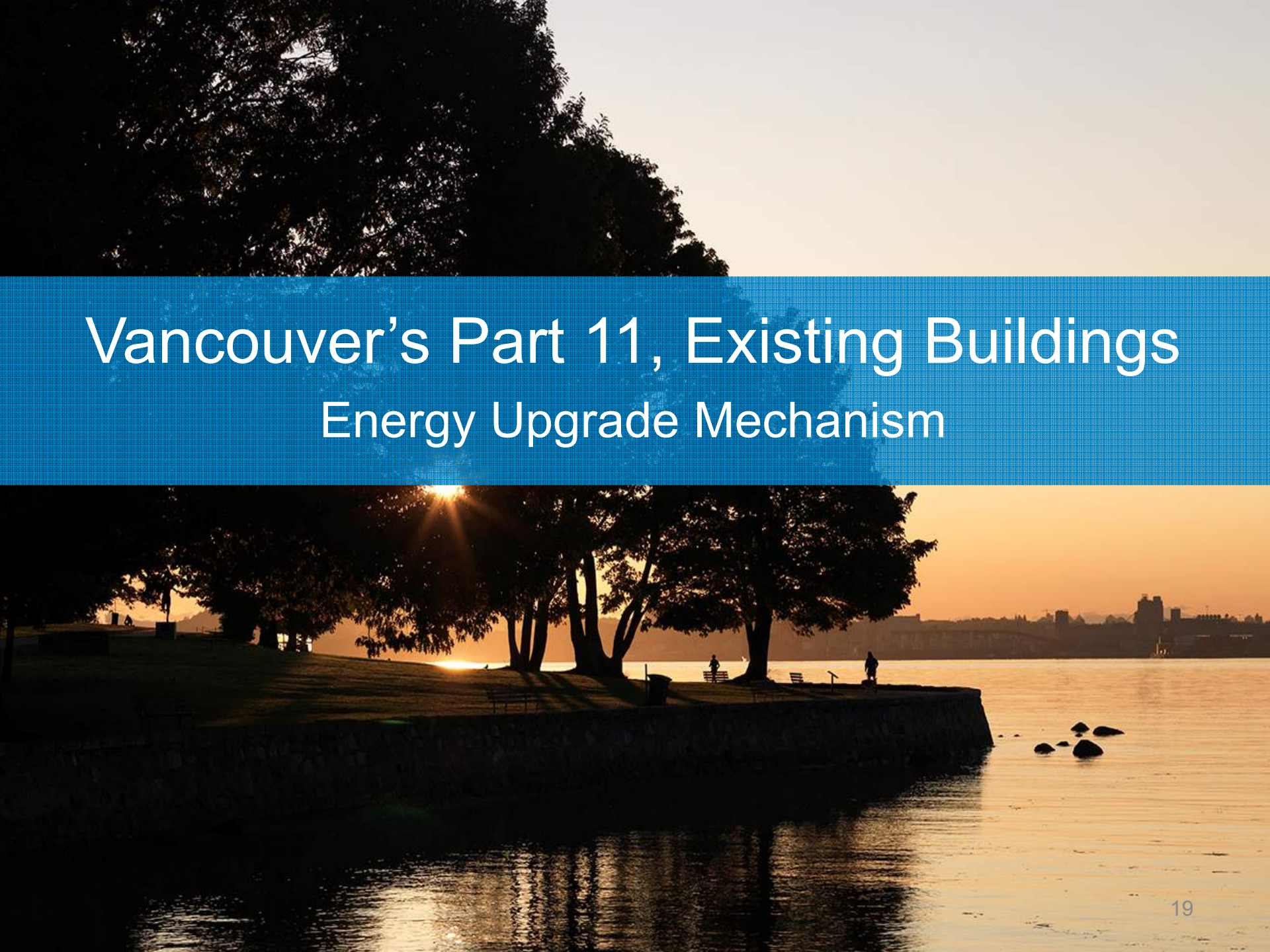
- Alterations to envelope must comply with Section 5
  - Alterations Exceptions:
    - (Must not increase building energy usage),

    e) Replacement of roof membrane w/o exposing existing insulation,

    f) Existing entrances without vestibules do not become entrances w vestibules

    g) Fenestration replacement of less than 25% of building's total glazing

Additional Energy Requirements for "Alterations to Existing Buildings"



Vancouver's Part 11, Existing Buildings

Energy Upgrade Mechanism

Vancouver's Building By-Law – Part 11 Upgrades

Essential difference from ASHRAE requirements is that the Part 11 Energy upgrades are based upon category of project/permit, specifically;

- Rehabilitation,
- Change of Major Occupancy Classification,
- Addition

Table 11.2.1.2.A
Project Types and Related Categories of Work

Project Type	Rehabilitation (See Flow Chart No. 1)	Change of Major Occupancy (See Flow Chart No. 2)	Addition (See Flow Chart No. 3)
Categories of Work	**V**oluntary Upgrade **R**epair/**S**mall Suite **M**inor Renovation **M**ajor Renovation **R**econstruction	**C**hange of Major Occupancy Classification **C**hange of Major Occupancy Classification to a Small Suite	**M**ajor Horizontal Addition **M**inor Horizontal Addition **M**ajor Vertical Addition **M**inor Vertical Addition

Step 1: Determine appropriate project type,

REHABILITATION PROJECT TYPE (Flow Chart No. 1)

Voluntary Building By-law Upgrades — Voluntary Building By-law upgrades are limited to alterations for fire alarm, sprinkler, exit, accessibility, seismic, building envelope, washrooms and kitchens for single room accommodation and energy efficiency work to an existing building.

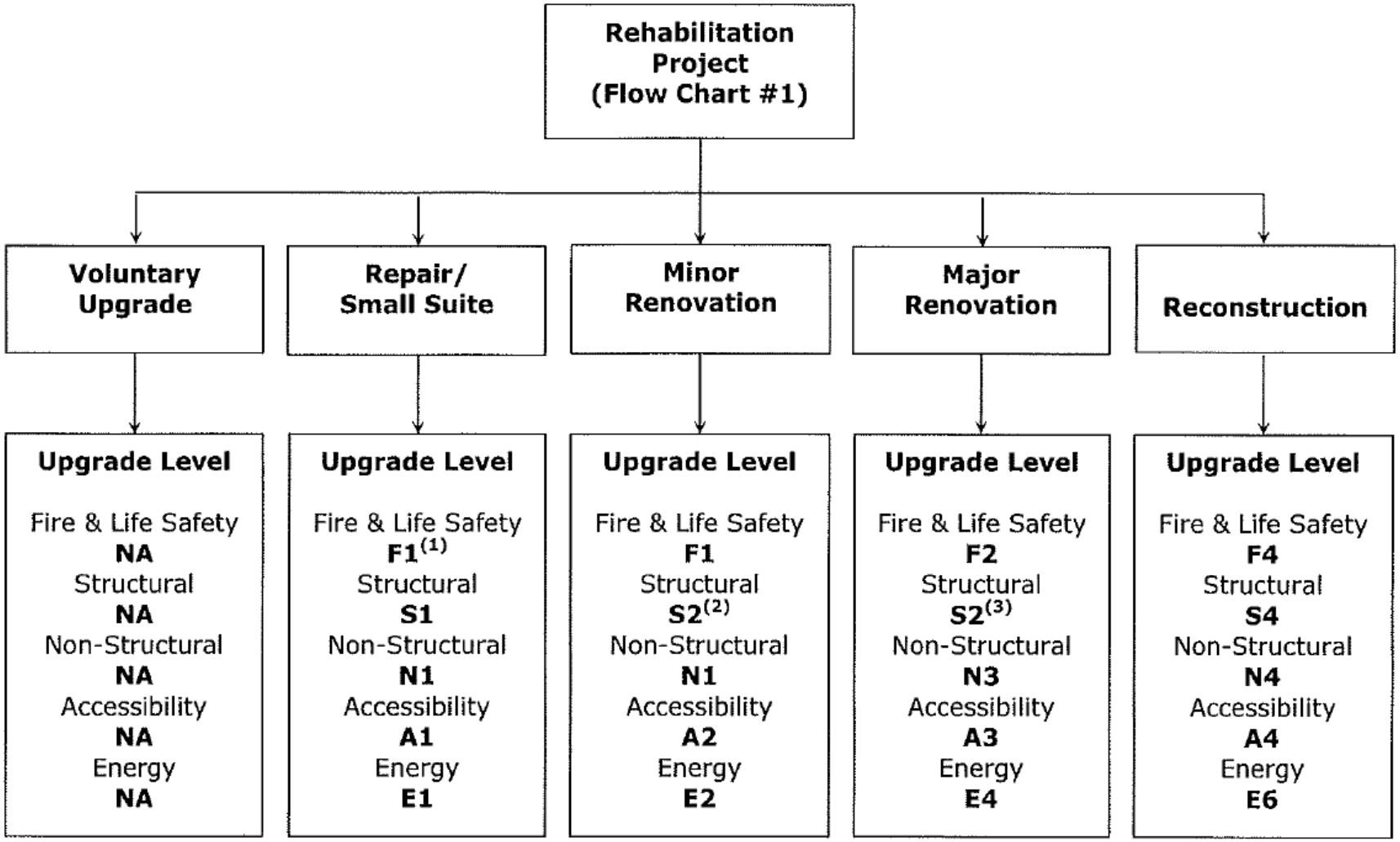
Repair — Repair is the replacement of any part of an existing building with like or similar materials for the repair or maintenance of the building. Repair work also includes repair to a building due to fire damage or the installation of a new kitchen exhaust system; however, a change of use or reconfiguration of the interior space is not considered to be a repair. If the repair includes other categories of work or project types such as a change of major occupancy or reconfiguration of the interior space; then, the most restrictive upgrade levels from all project types would be applied.

Minor Renovation — Minor renovations mean work within a single tenant space which may occupy multiple levels in a building. Minor renovations may include reconfiguration of the interior space of the suite as well as exterior renovations or the consolidation of more than one existing suite into a single new tenant space; however, a change of major occupancy classification is not considered to be a minor renovation type project. Where the renovation includes a new interconnected floor space or a new mezzanine, this work would not be considered to be a minor renovation. New mezzanines are considered to be additions. If the renovation includes other categories of work or project types such as a change of major occupancy classification or an addition (mezzanine), then the most restrictive upgrade levels from all project types would be applied.

CHANGE OF MAJOR OCCUPANCY CLASSIFICATION PROJECTS (Flow Chart No. 2)

Change of Major Occupancy Classification — Change of major occupancy classification means a change of use within a building or a suite where the proposed use is outside of the defined uses of the existing major occupancy classification permitted for the building or the suite.

Step 2: Determine appropriate flowchart and "E" value,



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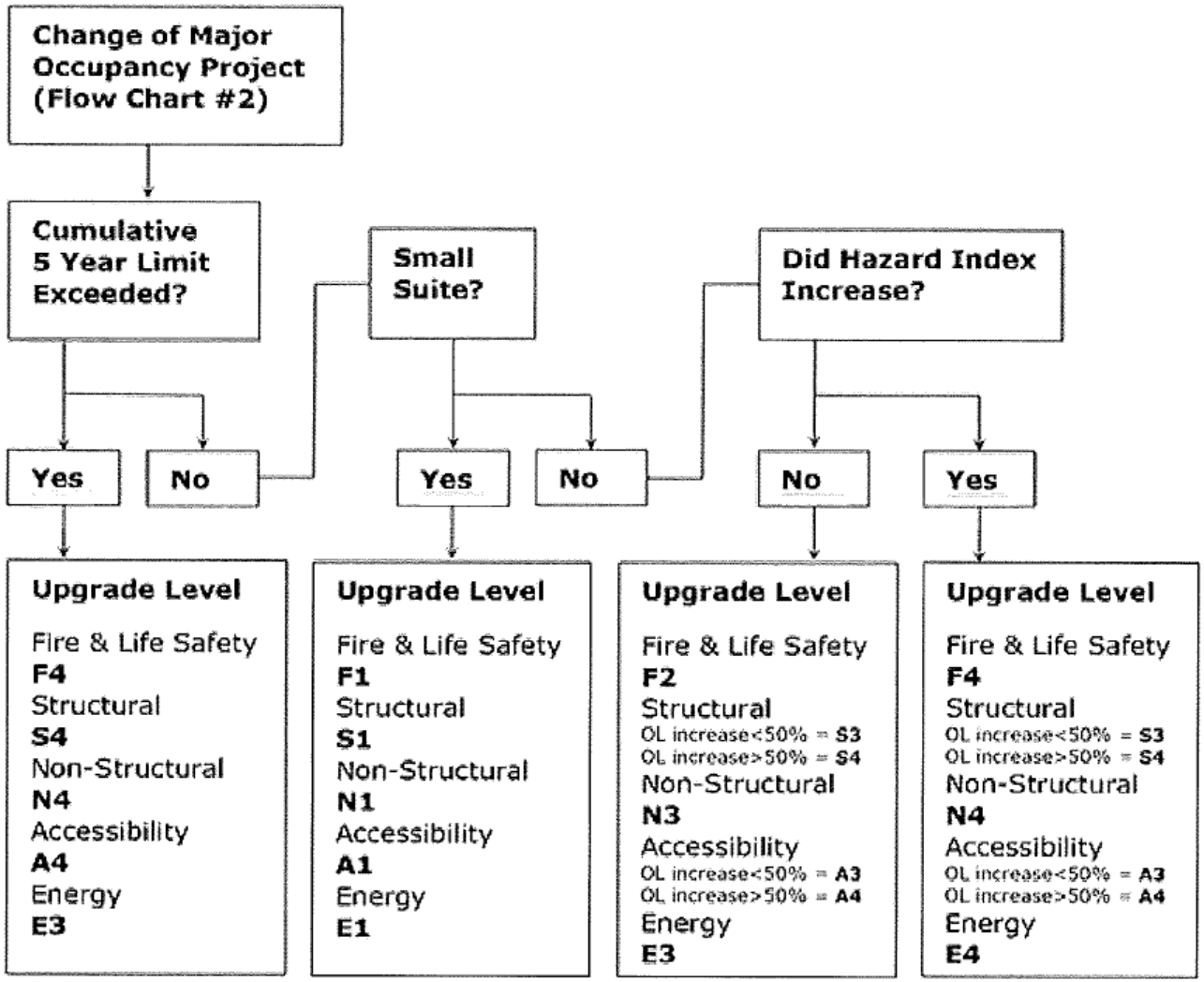

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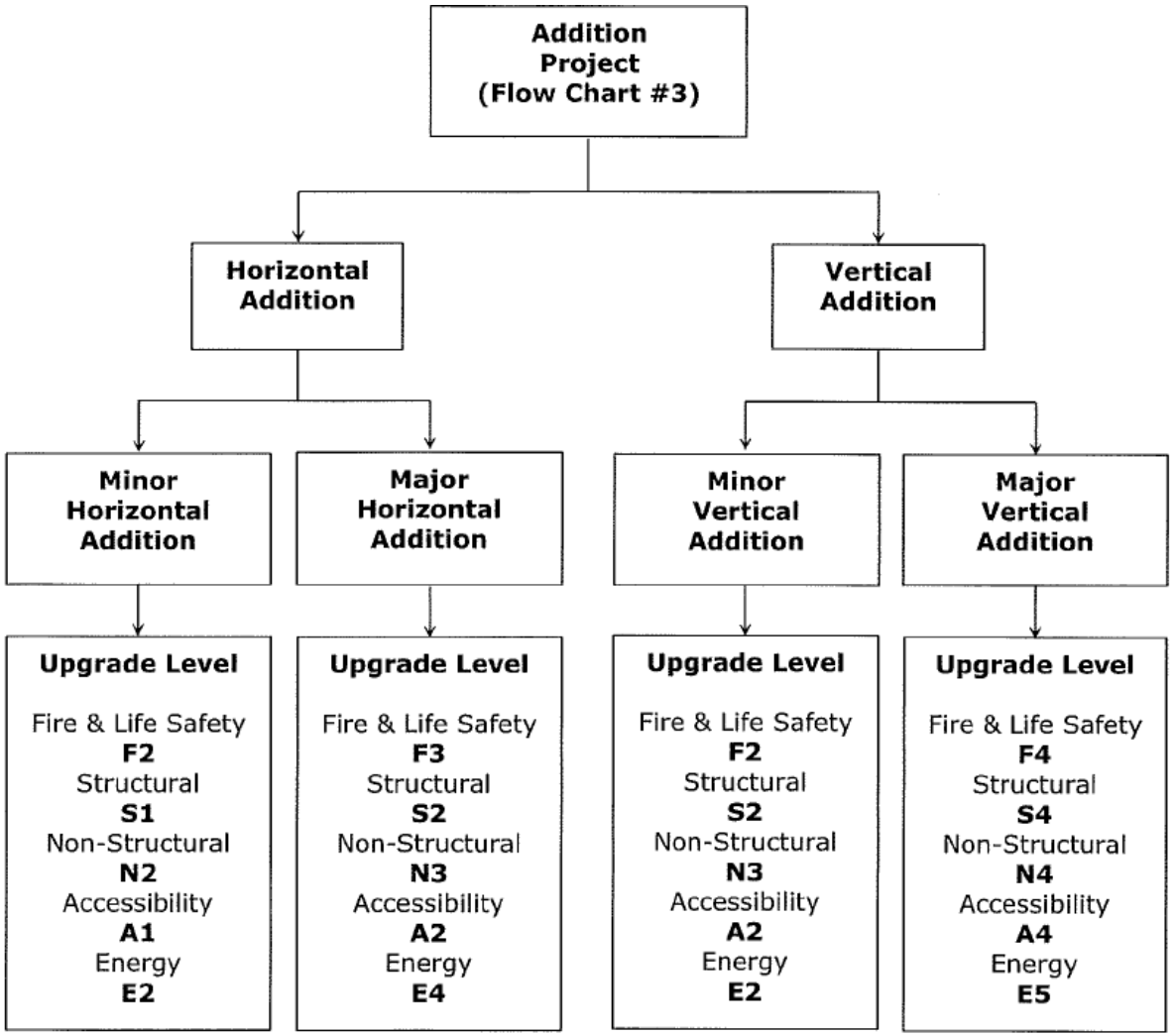


Step 3: Choose path (BOMA BESt or Retrofit "L"),

E1	E2	E3
MENU - Choose and complete all of the following; 1 @ L1 Requirements	BOMA BESt (Path 1) **OR** MENU - Choose and complete all of the following; 1 @ L2 Requirements	BOMA BESt (Path 2) **OR** MENU - Choose and complete all of the following; 1 @ L3 Requirements

E4	E5	E6
BOMA BESt (Path 2) **OR** MENU - Choose and complete all of the following; 1 @ L4 Requirements	BOMA BESt (Path 2) **OR** MENU - Choose and complete all of the following; 1 @ L6 Requirements	L7

Vancouver's Building By-Law – Part 11 Upgrades

Step 4: Select retrofit upgrade from appropriate "L" category (Example: Minor Renovation (E2) = 1 @ L2 upgrade),

Table 11.2.1.2.D
Alternative Acceptable Solutions for Energy Efficiency

L Level	Sections	Alternative Acceptable Solution Options
L2	Envelope	**1)** Reduce air leakage of all Loading Dock Doors (per 5.4.3.3 of ASHRAE 90.1 - 2010)
		2) Upgrade all Floor Insulation (per 5.5.3.4 of ASHRAE 90.1 - 2010)
		3) Reduce total Skylight Fenestration/Glazing Area to 5% of gross roof area (per 5.5.4.2.2. of ASHRAE 90.1 - 2010)
	HVAC(3)	**1)** Clean and Balance all Air Systems (per 6.7.2.3.2 of ASHRAE 90.1 - 2010)
		2) Balance all Hydronic Systems (per 6.7.2.3.3 of ASHRAE 90.1 - 2010)
	SWH(2)	**1)** Upgrade SWH system Temperature Controls (per 7.4.4.1 of ASHRAE 90.1 - 2010)
		2) Upgrade SWH system Temperature Maintenance Controls (per 7.4.4.2 of ASHRAE 90.1 - 2010)
		3) Upgrade SWH system Outlet Temperature Controls (per 7.4.4.3 of ASHRAE 90.1 - 2010)
		4) Upgrade SWH system Circulating Pump Controls (per 7.4.4.4 of ASHRAE 90.1 - 2010)
		5) Upgrade Pool systems (per 7.4.5 of ASHRAE 90.1 - 2010)
		6) Upgrade pipe risers to incorporate Heat Traps (per 7.4.6 of ASHRAE 90.1 - 2010)
	Lighting	**1)** Upgrade to incorporate Automatic Lighting Shutoff (per 9.4.1.1 of ASHRAE 90.1 - 2010)
		2) Upgrade to incorporate Space Control systems (per 9.4.1.2 of ASHRAE 90.1 - 2010)
		3) Upgrade to control Parking Garage Lighting (per 9.4.1.3 of ASHRAE 90.1 - 2010)
		4) Upgrade all Automatic Daylighting Controls for Primary Sidelighted Areas (per 9.4.1.4 of ASHRAE 90.1 - 2010)
		5) Upgrade all Automatic Daylighting Controls for Toplighting (per 9.4.1.5 of ASHRAE 90.1 - 2010)
		6) Upgrade to incorporate Additional Controls for specialized lighting (per 9.4.1.6 of ASHRAE 90.1 - 2010)
		7) Exterior Lighting Control (per 9.4.1.7 of ASHRAE 90.1 - 2010)
		8) Upgrade all hard wired lighting within scope of work area to High Efficiency light systems
		9) Upgrade all hard wired lighting within an occupied space to High Efficiency light systems

Vancouver's Building By-Law – Part 11 Upgrades

Step 4: Select retrofit upgrade from appropriate "L" category (Example: Minor Renovation (E2) = 1 @ L2 upgrade),

Step 5: Add the "L2" option to the scope of work by showing it as an instruction on the drawings,

Step 6: Submit energy compliance documentation to the city for review. Documentation typically includes;

- A completed "Energy Checklist for Alt to EB"

Vancouver's Building By-Law – Part 11 Upgrades

CITY OF VANCOUVER

VBBL - Part 10 Energy - ASHRAE 90.1 - 2010 Deliverables				Are Reg'd Professionals involved with this project?	No
Prescriptive Option - Deliverables (Required):					
Sect 5) Building Envelope	Info	No	Owner - V. N. Daloo	**Applicability:**	N/A
N/A	Building Envelope Compliance Form (Part I)	N/A	Energy Statements on Drawings	Dwg #:	N/A
N/A	Building Envelope Compliance Form (Part II)	N/A	Complies with 5.1.3 Envelope Alterations of 90.1		
or; N/A	Building Envelope Energy Performance Comparison Calculator				
Sect 6) HVAC	Info	Yes	ABC Mechanical - C. U. My	**Applicability:**	Applies
N/A	HVAC Simplified Approach	N/A	Energy Statements on Drawings	Dwg #:	N/A
or **both** of the following;		N/A	Complies with 6.1.1.2 Additions to Existing Buildings		
X	Mandatory Provisions	X	Complies with 6.1.1.3 Alterations to HVAC in EB		
X	Prescriptive Requirements	Source of Ventilation design:	ASHRAE 62 - 2001 (except addendum n)		
Sect 7) Service Water Heating	Info	Yes	ABC Mechanical - C. U. My	**Applicability:**	Applies
X	Service Water Heating Compliance Forms	N/A	Energy Statements on Drawings	Dwg #:	N/A
X	Electric Water Heater is Allowed	X	Complies with 7.1.1.3 Alterations to Existing Buildings		
Sect 8) Power		No	DEF Electrical - Shish K. Bab	**Applicability:**	N/A
Sect 9) Lighting	Info	Yes	DEF Electrical - Shish K. Bab	**Applicability:**	Applies
X	Lighting Compliance Forms (pdf)	N/A	Energy Statements on Drawings	Dwg #:	N/A
or the following;		X	Drawing: Reflected Ceiling Plan	Dwg #:	E1
N/A	Lighting Compliance Doc v1.00 (excel)	X	Complies with 9.1.2 Lighting Alterations		

Vancouver's Building By-Law – Part 11 Upgrades

VBBL - Part 11 Existing Buildings - Energy Upgrade Mechanism	Exemption:	None

Categories of Alterations	Path Options
Rehabilitation - Minor Renovation (E2)	E2 - Retrofit Path: 1 @ L2
Change of Major Occup - Hazard Index Not Increased (E3)	E3 - Retrofit Path: 1 @ L3

Dominant Option: E3 - Retrofit Path: 1 @ L3

Options Chosen and Incorporated into Project Drawings (indicate drawing numbers)

L3 - HVAC - Upgrade all Ducts, Plenums, and Insulation (per 6.4.4 of ASHRAE 90.1 - 2010)	Dwg #:	M3
	Dwg #:	
	Dwg #:	
Other:	Dwg #:	
Other:	Dwg #:	

Step 6: Submit energy compliance documentation to the city for review. Documentation typically includes;

- A completed "Energy Checklist for Alt to EB"
- Appropriately completed ASHRAE compliance forms
- A drawing with instruction for the "L#" upgrade

Rehabilitation – "Voluntary Upgrade"

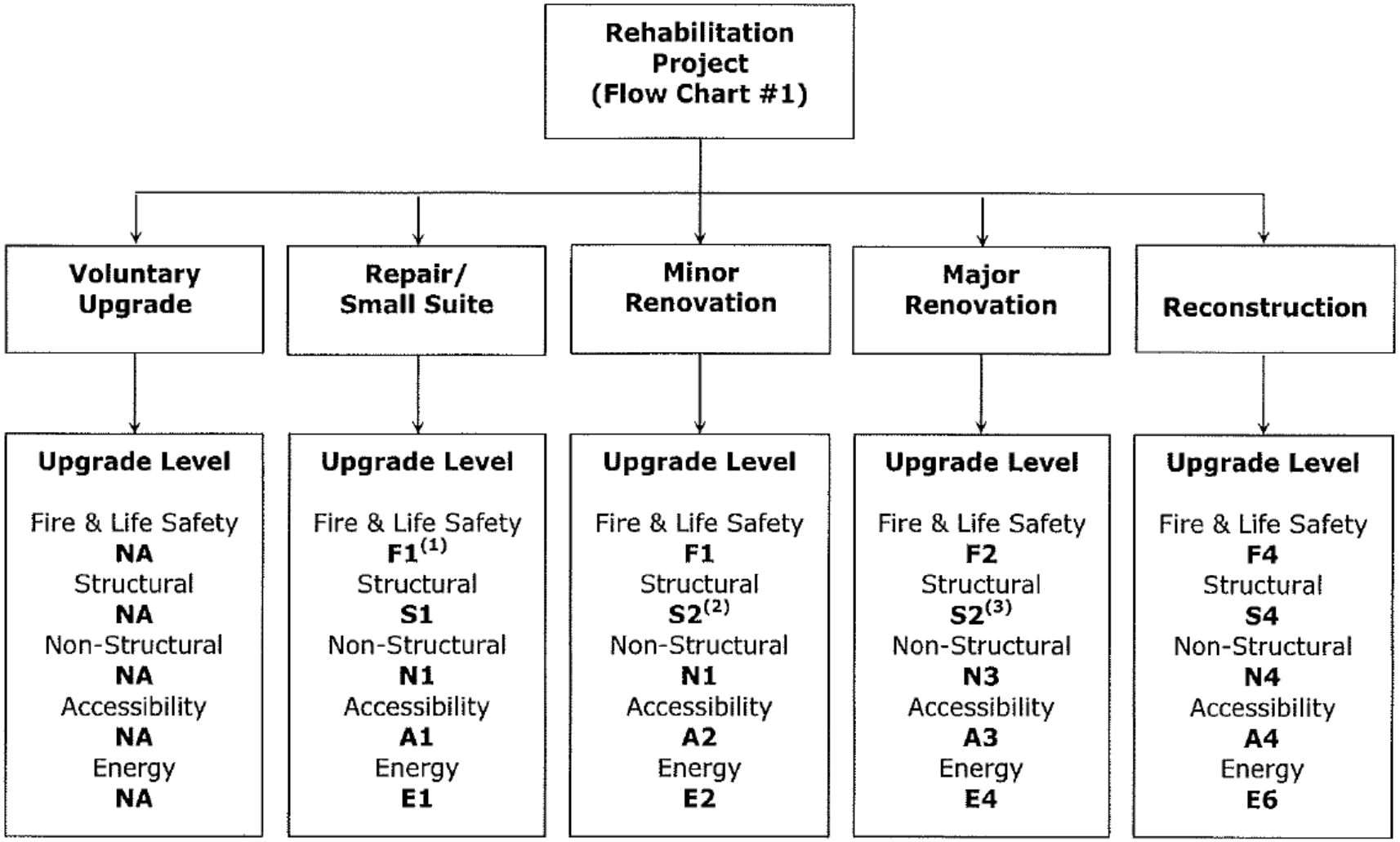
- Voluntary Upgrades are any upgrades performed voluntarily within the following 6 areas;

Life Safety	Seismic	Structural
Non-Structural	Accessibility	Energy

- Work classified as Voluntary Upgrade does not trigger additional upgrades across the 6 categories.

- All building envelope work is "Voluntary Upgrade" work.

Voluntary Upgrade: Does not trigger additional upgrades



Vancouver's Energy Web Page

All this information can be found on the
City of Vancouver's
Energy web page

Vancouver's Energy Web Page

Vancouver's Energy Requirements

Supported by an
Energy Webpage for large buildings…

vancouver.ca/building-energy-requirements

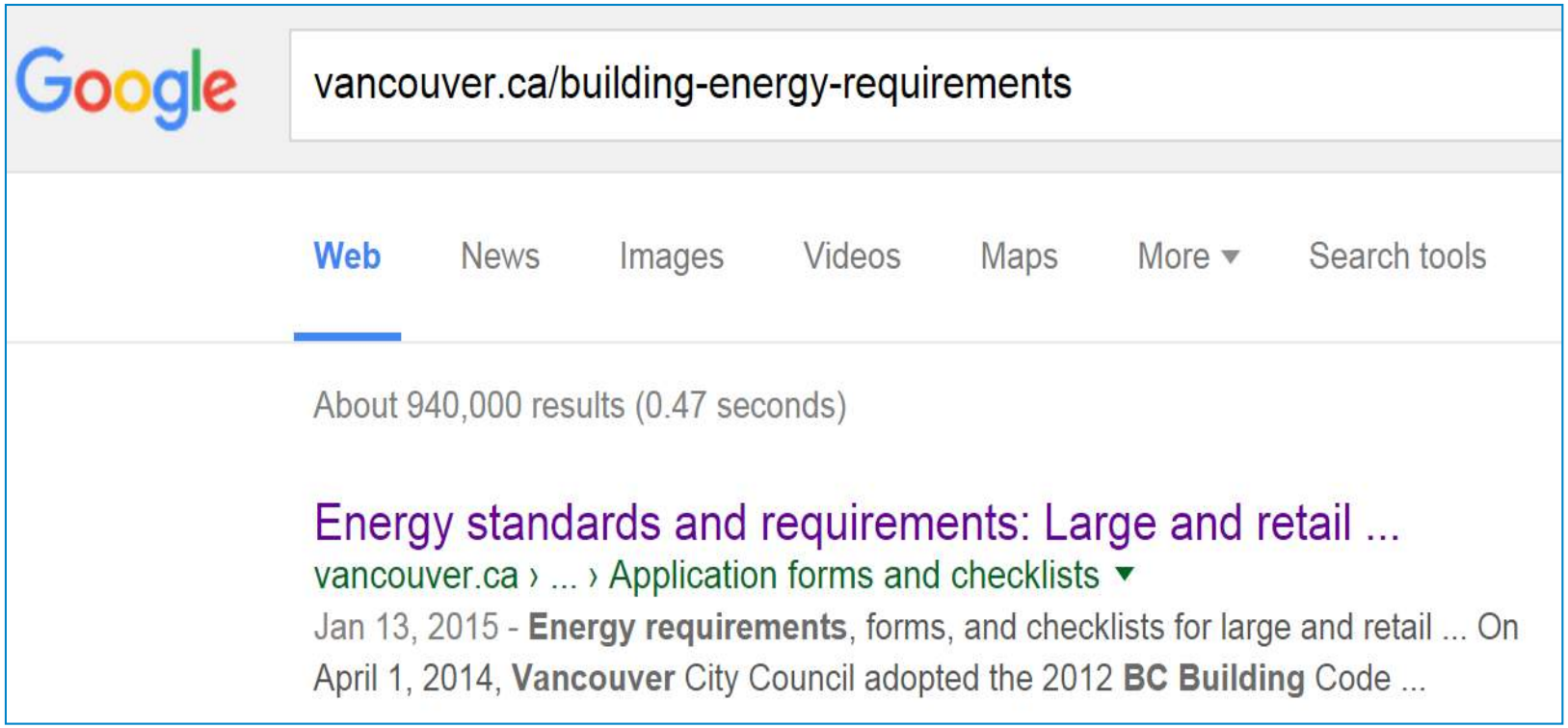
…and an Energy Broadcast;

- to industry, stakeholders, and both Architect and Engineering Associations

Vancouver's Energy Web Page

Vancouver's Energy Requirements

Supported by an
Energy Webpage for large buildings…



Vancouver's Energy Web Page

Vancouver's Energy Requirements

Click on "Show More" buttons to open sections

VBBL Part 10 (Energy and Water Efficiency)

Energy standards and conditions

Effective January 21, 2014, the Vancouver Building Bylaw requires the use of the energy standard ASHRAE 90.1-2010 or the energy code, National Energy Code of Canada for Buildings (NECB) 2011, in place of ASHRAE 90.1-2007. The standard and code have been implemented without additional addenda or errata.

In this section:

- ASHRAE 90.1-2010
- ASHRAE 90.1-2007
- NECB 2011
- Additional energy requirements (starting January 1, 2015)

Show more

VBBL Part 11 (Existing Buildings)

In this section:

- Archive drawings available as PDF
- Energy Upgrade Mechanism
- Preview of 2014 VBBL Part 11

Show more

Vancouver's Energy Web Page

Energy upgrade mechanism

The existing building energy upgrade mechanism process was implemented effective January 1, 2015. The requirements apply to all building permit applications of the following categories:

- Rehabilitation/TIs (repairs, minor and major renovations, reconstruction)
- Additions (vertical and horizontal)
- Change of major occupancy classifications

Preview of 2014 VBBL Part 11

The following documents provide a simplified view of the Part 11 energy upgrade mechanism process implemented on January 1, 2015. Part 11 and the associated Appendix A can be seen starting on pages 226 and 260, respectively, within the document adopted on April 1, 2014:

- Download a simplified version of the Part 11 Energy Upgrade Mechanism process (542 KB)
- Download the "mini 90.1" reference guide for the energy upgrade menu options (909 KB)
- Download Vancouver's additional requirements and revisions to the 2012 BCBC

When applying for building permits under alterations to existing buildings, use this energy requirements guide when using the alterations checklist:

- Download the energy requirements for tenant improvments (131 KB)
- Download the Energy Checklist for Alterations to Existing Buildings (630 KB)

Vancouver's Energy Web Page

Part 10 (Energy and Water Efficiency)

Energy standards and conditions

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ASHRAE 90.1-2010

Building permit applications using ASHRAE Standard 90.1-2010 must be in compliance with the following conditions:

- Applicability: May be used on any building, excluding:
  - Residential buildings of 3 storeys or less (regardless of size)
  - Temporary buildings
- Vancouver is to be considered within climate zone 5
- Ventilation must comply with ASHRAE 62-2001 (except addendum n)
- Projects over 3,000 gross square feet must have vestibules at all doors used as building entrances. (For exact requirements and exceptions, see 2014 Vancouver Building Bylaw Div B, 10.2.1.1.7)
- BE Trade-Off Method (COMcheck users): Starting February 2014, COMcheck software offers a dozen BC weather station locations. Vancouver projects are to choose the "Vancouver" location option.
- Exempt assemblies (starting July 1, 2014): Modelers are to follow requirements of Table 11.3.1.5.a. using 1% in place of the 5% indicated.
- Download the ASHRAE 90.1-2010 Checklist (375 KB)
- View the tutorial on the 90.1-2010 Checklist (2.9 MB)

Vancouver's Energy Web Page

NECB 2011

Note: Neither the CanQuest modeling software nor the NECB Checklist are compatible with Mac OS software. (Microsoft plans to provide compatibility with .xlsm files in Excel for Mac 2011 and 2014 versions during 2014.)

Building permit applications using the National Energy Code of Canada for Buildings (NECB) 2011 must be in compliance with the following conditions:

- Applicability: Part 3 buildings, new construction only
- Vancouver is to be considered within climate zone 4
- Ventilation must comply with ASHRAE 62-2001 (except addendum n)
- Projects over 3,000 gross square feet must have vestibules at all doors used as building entrances. (For exact requirements and exceptions, see 2014 Vancouver Building Bylaw Div B, 10.2.1.1.7)
- For projects with glazing and skylight ratios below Prescriptive maximums (40% and 5%, respectively), ensure that window-wall and skylight-roof ratios of the reference building are identical to the ratios of the proposed building
- Vertical glazing Solar Heat Gain Coefficient (SHGC), Assembly Maximum = 0.40
- Skylight SHGC without Curb, or with Curb and Glass:
  - % of Roof: 0% – 2.0%, Assembly Maximum SHGC (all) = 0.49
  - % of Roof: 2.1% – 5.0%, Assembly Maximum SHGC (all) = 0.39
- Skylight SHGC with Curb and Plastic:
  - % of Roof: 0% – 2.0%, Assembly Maximum SHGC (all) = 0.77
  - % of Roof: 2.1% – 5.0%, Assembly Maximum SHGC (all) = 0.62
- Download the NECB 2011 Checklist (2.3 MB)

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Thank You