Ontario Building Code Breakfast

SB-10 Implications on Design

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29 April 2014

OBC Application in GTA
Toronto Green Standard

Toronto Green Standard
Making a Sustainable City Happen

For
Mid to High-Rise Residential and Non-Residential Development
(Residential apartment buildings 4 storeys and higher and all industrial, commercial and institutional (IG) buildings)

Version 2.0
January 2014
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Exterior Building Envelope
Mandatory Provisions

ADAPTABILITY
FLEXIBILITY
DURABILITY
Exterior Building Envelope
Mandatory Provisions

ASHRAE 90.1-2010 AND OBC SB-10 DIVISION 2--BUILDING ENVELOPE PROVISIONS

SECTION 5.4 MANDATORY PROVISIONS
Building insulation has been designed to comply with section 5.4.1 of ASHRAE 90.1-2010 as modified by Division 2 of OBC SB-10.

Building fenestration and doors have been designed to comply with section 5.4.2 of ASHRAE 90.1-2010 as modified by Division 2 of OBC SB-10.

Building air leakage has been designed to comply with section 5.4.3 of ASHRAE 90.1-2010 as modified by Division 2 of OBC SB-10.

Exterior Building Envelope
Insulation Values

<table>
<thead>
<tr>
<th>Zone 1 &amp; 2</th>
<th>Zone 3 &amp; 4</th>
<th>Zone 5</th>
<th>Zone 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000-1800 &lt; 4000</td>
<td>4000 &lt; 1000</td>
<td>1800-4000</td>
<td>1000-1800</td>
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<tr>
<td>Ajax</td>
<td>Markham</td>
<td>Vaughan</td>
<td>Mississauga</td>
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<tr>
<td>Etobicoke</td>
<td>Toronto</td>
<td>North York</td>
<td>Scarborough</td>
</tr>
</tbody>
</table>

Select
1. Climactic Zone
2. Wall/Roof Assembly - Insulation R-Value
3. Window Assembly - Window U-Value
Exterior Building Envelope
Effective R-Value vs. Nominal R-Value

- Continuous Insulation is about the insulation performance
- Adding more insulation does not mean higher effective R-Value

Exterior Building Envelope
Thermal Bridging

Details Matter
- Insulation performance is related directly to the details
Energy Modeling
Archetype Condo Project

Archetype Condominium Final Report

- Charrette
- Energy Modeling

Energy Modeling
Archetype Condo Project
Energy Modeling Window to Wall Ratios
Archetype Condo Project

Archetype Condominium
Final Report

1. What is the impact of reduce the area of vision glass?

<table>
<thead>
<tr>
<th>Baseline Case: 'Realistic' R-11 Spandrel, ASHRAE 2010 Roof; ASHRAE 2010 Window U-value (0.55)</th>
<th>Consumption</th>
<th>Incremental Change</th>
<th>Relative Performance (%)</th>
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<tbody>
<tr>
<td>OBC (ASHRAE SS-10+5%)</td>
<td>1963154</td>
<td>371970</td>
<td>5906035</td>
</tr>
<tr>
<td>Baseline (70% WWR)</td>
<td>2413253</td>
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<td>40% WWR</td>
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<td>399956</td>
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</table>
Energy Modeling Window to Wall Ratios 70%  
Archetype Condo Project

-20.3%

Energy Modeling Window to Wall Ratios 60%  
Archetype Condo Project

-16.0%
Energy Modeling Window to Wall Ratios 50%
Archetype Condo Project

-11.3%

Energy Modeling Window to Wall Ratios 40%
Archetype Condo Project

-6.8%
Archetype Condominium Final Report

1. What is the impact of reducing the area of vision glass?
2. What is the impact of increasing the overall performance of the fenestration?

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| Upgrade 1: 'Realistic' R-11 Spandrel; ASHRAE 2010 Roof; Upgraded Window U-value (0.35) | Consumption | Incremental Change | Relative Performance (%)
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Osc (ASHRAE SS-10+5%)</td>
<td>Elec (kWh)</td>
<td>Gas (m³)</td>
<td>Total (kWh)</td>
</tr>
<tr>
<td>Baseline (70% WWR)</td>
<td>1963154</td>
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<td>65% WWR</td>
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<td>40% WWR</td>
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</table>
Energy Modeling Window U-Value 70%
Archetype Condo Project

Percentage refers to percentage below SB10 energy target

-12.5%

Energy Modeling Window U-Value 60%
Archetype Condo Project

Percentage refers to percentage below SB10 energy target

-9.0%
Energy Modeling Window U-Value 50%
Archetype Condo Project

-5.3%

Percentage refers to percentage below SB10 energy target

Energy Modeling Window U-Value 40%
Archetype Condo Project

-1.7%

Percentage refers to percentage below SB10 energy target
Archetype Condominium Final Report

1. What is the impact of reducing the area of vision glass?
2. What is the impact of increasing the overall performance of the fenestration?
3. What happens if the spandrel glass is replaced with a higher performing wall assembly?

<table>
<thead>
<tr>
<th>OBC (ASHRAE SB-10+5%)</th>
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<th>Relative Performance (%)</th>
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<td>Gas (m3)</td>
<td>Total (kWh)</td>
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<tr>
<td>Baseline (70% WWR)</td>
<td>163154</td>
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<td>65% WWR</td>
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<td>40% WWR</td>
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</table>
Energy Modeling Opaque Assembly 70%
Archetype Condo Project

Energy Modeling Opaque Assembly 60%
Archetype Condo Project
Energy Modeling Opaque Assembly 50%
Archetype Condo Project

-3.7%

Energy Modeling Opaque Assembly 40%
Archetype Condo Project

0.4%

(Percentage refers to percentage below SB10 energy target)
Comparing Energy Models
Project Results – Compared to MNECB

Conclusions

Key Issues

Summary

• Be aware of the required insulation in your climactic zone;
• Think effective R-Value rather than nominal and confirm your assumptions early;
• Energy model during design development to confirm you are meeting your energy targets;
• Minimize the percentage of glazing and specify the best possible window system within the project budget;
• Reduce thermal bridging through careful detailing;
• Ask a lot of questions. Engage in the dialogue.
Thank you
mxuereb@quadrangle.ca