6.0 – APPENDIX C
BELOW-GRADE REINFORCEMENT TABLES
FOR PROVINCES BC, QB

TABLE OF CONTENTS

APPENDIX

Canadian LOGIX below-grade tables with seismic loading considered are available for download at www.logixicf.com by clicking “Technical Library”, “Design Manual”, “Engineering”.

The tables are grouped into the following provinces:

- AB, SK, MB, NF, PEI, NS
- ON, NB
- BC, QB

APPENDIX A - BELOW-GRADE REINFORCEMENT TABLES
FOR PROVINCES AB, SK, MB, NF, PEI, NS
APPENDIX B - BELOW-GRADE REINFORCEMENT TABLES
FOR PROVINCES ON, NB
DISCLAIMER
By using the LOGIX Design Manual, in part or in whole, the user accepts the following terms and conditions.

The LOGIX Design Manual shall be used for the sole purpose of estimating, design or construction of LOGIX Insulated Concrete Forms used in residential, commercial or industrial structures.

The information represented herein is to be used as a reference guide only. The user shall check to ensure the information provided in this manual, including updates and amendments, meets local building codes and construction practices by consulting local building officials, construction and design professionals, including any additional requirements.

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6.0 – APPENDIX C
BELOW-GRADE REINFORCEMENT TABLES
FOR PROVINCES BC, QB

LOGIX
CANADIAN
ENGINEERING REPORT

CONTENTS

• Introduction
• Structural Design & Performance
• Reinforcement Tables
• Figure 1 Crawl Space Reinforcement Requirements
• Below Grade Wall Tables
• Figures 2A, 2B, 2C and 2D, Below-grade wall sections
• Tables 1A, 1B, 1C and 1D, Below-grade Wall Minimum Vertical Reinforcement for LOGIX 6.25, 8, 10 and 12 inch, respectively
• Above Grade Wall Table
• Figures 3A, 3B and 3C, Above-grade wall sections
• Table 2, LOGIX Above-Grade Wall Minimum Reinforcement
• Lintel Tables
• Figure 4, Lintel Reinforcement
• Tables 3A, 3B, 3C, 3D and 3E, Lintel Reinforcement with Uniform Load for LOGIX 4, 6.25, 8, 10 and 12 Inch, respectively.
• Tables 4A, 4B, 4C, 4D and 4E, Lintel Reinforcement with Concentrated Load for LOGIX 4, 6.25, 8, 10 and 12 Inch, respectively.

Reviewed for projects constructed in the following provinces:

British Columbia, Alberta, Saskatchewan, Manitoba and Ontario

by:
Colinares Consulting....
INTRODUCTION
LOGIX walls are intended to be used both above and below grade, and can carry large vertical as well as lateral loads. They are particularly effective for residential, commercial and industrial buildings; providing excellent insulation as well as thermal mass and structural strength. They can be easily adapted to accommodate concrete floors and other “non-standard” building systems.

Construction must be in conformance with the LOGIX Design Manual, including assembly of formwork, bracing, accurate rebar positioning, concrete mix design and placement, and details for interconnection with the other building components.

STRUCTURAL DESIGN AND PERFORMANCE
The LOGIX Building System can be used for an infinite variety of building situations with proper engineering. This report, with its load tables and diagrams, is intended to assist with the structural design of buildings using the LOGIX system for the basement only, or continuing to a second floor and/or roof. Where unusual conditions are encountered, it is recommended that the user consult a designer who can evaluate the loadings to the various components and who can appreciate the limitations of “prescriptive” design under unusual conditions. Connection details have generally been excluded from this report because of the great variety of floor and roof systems that can be used with the Logix wall system. The designer should refer to the Logix Product Manual and the literature for the various proprietary products that are available for connections, which are an important part of the total design.

REINFORCEMENT TABLES
Below-grade walls were developed using the design criteria of Part 4 of the National Building Code of Canada 2005, and CSA A23.3-04, Design of Concrete Structures.

The reinforcement tables allow for bar spacings common in residential construction. This is further reflected by the fact that building codes in the United States (International Residential Code 2006) allows for larger bar spacings, and the use of ICF walls above-grade with concrete core thicknesses of 3.5 inches.

Building limitations used to develop Tables 1A to 1D include:

Building perimeter = 24.384 m (80 ft) max x 12.192 m (40 ft) max
Roof clear span = 12.192 m (40 ft) max
Floor clear span = 6.096 m (20 ft) max
Number of stories above grade = 2 max
Number of stories below grade = 1

In addition, crawl space reinforcement requirements were developed and can be found in Figure 1.

More specific design assumptions and limitations are located with the corresponding reinforcement tables.
6.0 – APPENDIX C
BELOW-GRADE REINFORCEMENT TABLES
FOR PROVINCES BC, QB

FIGURE 1 - CRAWL SPACE REINFORCEMENT REQUIREMENT

---

1. 4" LOGIX wall: \( d = 2.5" \)
   6.25" LOGIX wall: \( d = 4.375" \)
   8" LOGIX wall: \( d = 6" \)
   10" LOGIX wall: \( d = 8" \)
   12" LOGIX wall: \( d = 10" \)

2. Min. vertical rebar: use 10M @ max. 48" on center spacing for the following conditions (applicable to all LOGIX wall sizes):
   Wall height: \( \leq 4' - 10" \)
   Equivalent fluid density: \( \leq 75 \text{pcf (12 kN/m}^3) \) w/ no surcharge.

3. Horizontal rebar (applicable to all LOGIX wall sizes: 10M @ 32" on center max spacing. Provide at least one 10M horizontal bar in bottom and top course.

4. For 12" LOGIX wall provide additional mat of 10M rebar near exterior side of wall. Vertical and horizontal rebar spacing to match spacing of interior rebar.
6.0 – APPENDIX C
BELOW-GRADE REINFORCEMENT TABLES
FOR PROVINCES BC, QB

BELOW-GRADE WALL TABLES

NOTE FOR BELOW-GRADE WALL TABLES

LOGIX below-grade Tables 1A to 1D shall be used in conjunction with corresponding Figures 2A to 2D, the notes listed below, and the building limitations noted in the “Reinforcement Tables” section, which form the basis of these tables.

1. Governing load case is predominantly seismic loading. The tables apply to seismic loading applicable to Canadian provinces BC and QB. For seismic load considerations applicable for other provinces refer to the Appendix in the Table of Contents. Factored snow load = 3.54 kPa
2. Horizontal rebar shall be 10M @ 32" o/c. Provide at least one 10M rebar to be placed at the bottom course and top course.
3. Steel yield strength = 400MPa, 28 day concrete compressive strength = 20MPa
4. Deflection criteria = L/240
5. Assumed eccentricity = 3" (to account for loads on LOGIX Brick Ledge).
6. The basement walls must be supported at the top and bottom of the wall.
7. For light vehicles parked or travelling near the wall use reinforcement corresponding to 1 ft higher backfill.
8. Where spaces have been left blank, the corresponding bar size is presumed to be less economical and/or practical than that shown. Consult a local licensed engineer to determine proper design.
9. Provide two 15M bars (One 15M bar for 4" concrete core thickness) should be placed around all openings (along the vertical sides and bottom of opening), and extend a minimum of 2 ft beyond openings.
10. For walls with over 50% of height exposed to wind, also check rebar requirements for above-grade walls.
11. Carefully consider floor/wall connection details for lateral loads, especially with higher backfills, walkout basements, and active seismic areas.
12. Soil density is often referred to as “equivalent fluid density”, and is the density of a liquid which would exert an equivalent horizontal load on a wall. The actual soil density is generally greater – ranging between 90 & 120pcf.
13. Consult a local licensed engineer for design of walls that fall outside the scope of the tables.
### 6.0 – APPENDIX C

#### BELOW-GRADE REINFORCEMENT TABLES

**FOR PROVINCES BC, QB**

**TABLE 1A - LOGIX 6.25” BELOW-GRADE WALL MINIMUM VERTICAL REINFORCEMENT**

<table>
<thead>
<tr>
<th>Max. Height of Basement Wall, ft</th>
<th>Max. Unbalanced Backfill Height, ft</th>
<th>Vertical Bar Spacing, in.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Maximum Equivalent Density 30pcf</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>16 40 48 48</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>8 16 24 48</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>6 12 16 32</td>
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<tr>
<td>5</td>
<td></td>
<td>4 16 12 48</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>12 24 48 48</td>
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<td>10</td>
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<td>8 16 24 48</td>
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<td>11</td>
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<td>6 12 16 32</td>
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<tr>
<td>12</td>
<td></td>
<td>4 16 12 48</td>
</tr>
</tbody>
</table>

**NOTES:**

1. Tables are applicable for seismic load conditions in Canadian provinces BC and QB. For seismic load considerations applicable to other provinces refer to the Appendix in the Table of Contents.

2. Reinforcement to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar) = 4.375”

3. Table 1A shall be read in conjunction with Fig 2A, and section “Notes for Below-grade Wall Tables.”

4. 1 ft = 0.3048 m, 1 in = 25.4 mm, 1 pcf = 16.02 kg/m$^3$ = 0.157 kN/m$^3$
### TABLE 1B - LOGIX 8” BELOW-GRADE WALL MINIMUM VERTICAL REINFORCEMENT

**NOTE:** LOGIX recommends builders, owners and/or designers using these tables confirm that on-site building conditions are within the scope of the tables being used.

<table>
<thead>
<tr>
<th>Max. Height of Basement Wall, ft</th>
<th>Max. Unbalanced Backfill, ft</th>
<th>Maximum Vertical Bar Spacing, in.</th>
<th>Maximum Equivalent Density 30pcf</th>
<th>Maximum Equivalent Density 45pcf</th>
<th>Maximum Equivalent Density 60pcf</th>
<th>Maximum Equivalent Density 75pcf</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>32</td>
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<td>32</td>
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<td>32</td>
</tr>
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<td>48</td>
<td>48</td>
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</tr>
<tr>
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</tr>
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<td>48</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Tables are applicable for seismic load conditions in Canadian provinces BC and QB. For seismic load considerations applicable to other provinces refer to the Appendix in the Table of Contents.
2. Reinforcement to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar) = 6”
3. Table 1B shall be read in conjunction with Fig 2B, and section "Notes for Below-grade Wall Tables."
4. 1 ft = 0.3048 m, 1 in = 25.4 mm, 1 pcf = 16.02 kg/m³ = 0.157 kN/m²
### 6.0 – APPENDIX C

#### BELOW-GRADE REINFORCEMENT TABLES
FOR PROVINCES BC, QB

**TABLE 1C - LOGIX 10” BELOW-GRADE WALL MINIMUM VERTICAL REINFORCEMENT**

**NOTE:** LOGIX recommends builders, owners and/or designers using these tables confirm that on-site building conditions are w/in the scope of the tables being used.

<table>
<thead>
<tr>
<th>Max. Height of Basement Wall, ft</th>
<th>Max. Unbalanced Backfill Height, ft</th>
<th>Vertical Bar Spacing, in.</th>
<th>Maximum Equivalent Density 30pcf</th>
<th>Maximum Equivalent Density 45pcf</th>
<th>Maximum Equivalent Density 60pcf</th>
<th>Maximum Equivalent Density 75pcf</th>
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<td>24 48 48 48</td>
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<td>24 48 48 48</td>
<td>16 40 48 48</td>
</tr>
<tr>
<td>20</td>
<td></td>
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<td>24 48 48 48</td>
<td>24 48 48 48</td>
<td>24 48 48 48</td>
<td>16 40 48 48</td>
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<td>6 12 16 32</td>
</tr>
<tr>
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<td></td>
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<td>6 12 16 32</td>
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<td>6 12 16 32</td>
</tr>
<tr>
<td>25M</td>
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</tr>
<tr>
<td>10M 15M 20M 25M</td>
<td></td>
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<td>6 12 16 32</td>
<td>6 12 16 32</td>
<td>6 12 16 32</td>
<td>6 12 16 32</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Tables are applicable for seismic load conditions in Canadian provinces BC and QB. For seismic load considerations applicable to other provinces refer to the Appendix in the Table of Contents.
2. Reinforcement to be placed on interior face of concrete wall. Effective depth of vertical rebar (exterior face of concrete to center of vertical rebar = 8”
3. Table 1C shall be read in conjunction with Fig 2C, and section “Notes for Below-grade Wall Tables.”
4. 1 ft = 0.3048 m, 1 in = 25.4 mm, 1 pcf = 16.02 kg/m³ = 0.175 kN/m²

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Rev. Oct 01/09
## 6.0 – APPENDIX C
### BELOW-GRDADE REINFORCEMENT TABLES FOR PROVINCES BC, QB

**TABLE 1D - LOGIX 12” BELOW-GRADE WALL MINIMUM VERTICAL REINFORCEMENT**

<table>
<thead>
<tr>
<th>Max. Height of Basement Wall, ft</th>
<th>Max. Unbalanced Backfill Height, ft</th>
<th>Vertical Bar Spacing, in.</th>
<th>Maximum Equivalent Density 30pcf</th>
<th>Maximum Equivalent Density 45pcf</th>
<th>Maximum Equivalent Density 60pcf</th>
<th>Maximum Equivalent Density 75pcf</th>
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</thead>
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<td>14</td>
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<td>16</td>
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</tr>
<tr>
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<td>24 48 48 48</td>
<td>24 48 48 48</td>
<td>24 48 48 48</td>
<td>24 48 48 48</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Tables are applicable for seismic load conditions in Canadian provinces BC and QB. For seismic load considerations applicable to other provinces refer to the Appendix in the Table of Contents.
2. Effective depth (out face of concrete to center of vertical rebar = 10”
3. Provide additional mat of rebar near exterior face of concrete surface:
   - Horizontal = 10M @ 32” o/c.
   - Vertical = 10M to match vertical rebar spacing
4. **Table 1D** shall be read in conjunction with **Fig 2D**, and section “Notes for Below-grade Wall Tables.”
5. 1 ft = 0.3048 m, 1 in = 25.4 mm, 1 pcF = 16.02 kg/m³ = 0.157 kN/m²

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6 – 11