


Use one form for each individual who reviews and takes responsibility for design activities with respect to the project.

|  |  |   |   |   |   |
|--|--|---|---|---|---|
| <b>A. Project Information</b>  |  |   |   |   |   |
| Building number, street name<br><div style="text-align: center;"><b>Model 3250 WOB</b></div>   |  |   |   |   | Lot:<br><div style="text-align: center;">Lot/con.</div> |
| Municipality<br><div style="text-align: center;"><b>Richmond Hill</b></div>  |  | Postal code   | Plan number/ other description  |   |   |
| <b>B. Individual who reviews and takes responsibility for design activities</b>  |  |   |   |   |   |
| Name<br><div style="text-align: center;"><b>David DaCosta</b></div>  |  | Firm<br><div style="text-align: center;"><b>gtaDesigns Inc.</b></div> |   |   |   |
| Street address<br><div style="text-align: center;"><b>2985 Drew Road, Suite 202</b></div>  |  |   |   | Unit no.  | Lot/con.  |
| Municipality<br><div style="text-align: center;"><b>Mississauga</b></div>  |  | Postal code<br><div style="text-align: center;"><b>L4T 0A4</b></div>  | Province<br><div style="text-align: center;"><b>Ontario</b></div>   | E-mail<br><div style="text-align: center;"><a href="mailto:hvac@gtadesigns.ca">hvac@gtadesigns.ca</a></div> |   |
| Telephone number<br><div style="text-align: center;"><b>(905) 671-9800</b></div>   |  | Fax number  |   | Cell number   |   |
| <b>C. Design activities undertaken by individual identified in Section B. [Building Code Table 3.5.2.1 of Division C]</b>  |  |   |   |   |   |
| <div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"><input type="checkbox"/> House</div> <div style="width: 33%;"><input checked="" type="checkbox"/> HVAC – House</div> <div style="width: 33%;"><input type="checkbox"/> Building Structural</div> <div style="width: 33%;"><input type="checkbox"/> Small Buildings</div> <div style="width: 33%;"><input type="checkbox"/> Building Services</div> <div style="width: 33%;"><input type="checkbox"/> Plumbing – House</div> <div style="width: 33%;"><input type="checkbox"/> Large Buildings</div> <div style="width: 33%;"><input type="checkbox"/> Detection, Lighting and Power</div> <div style="width: 33%;"><input type="checkbox"/> Plumbing – All Buildings</div> <div style="width: 33%;"><input type="checkbox"/> Complex Buildings</div> <div style="width: 33%;"><input type="checkbox"/> Fire Protection</div> <div style="width: 33%;"><input type="checkbox"/> On-site Sewage Systems</div> </div>  |  |   |   |   |   |
| <b>Description of designer's work</b>  |  |   |   |   |   |
| <b>Model Certification</b>   |  |   |   | Project #:  | <b>PJ-00267</b>   |
|  |  |   |   | Layout #:   | <b>JB-09092</b>   |
| Heating and Cooling Load Calculations  |  | Main  | X   | Builder<br><b>EM Air Systems</b>  |   |
| Air System Design  |  | Alternate   |   | Project<br><b>King East Developments</b>  |   |
| Residential mechanical ventilation Design Summary  |  | O.D. GFA  | 3237  | Model<br><b>Model 3250 WOB</b>  |   |
| Residential System Design per CAN/CSA-F280-12  |  |   |   | SB-12<br><b>Energy Star</b>   |   |
| Residential New Construction - Forced Air  |  |   |   |   |   |
| <b>D. Declaration of Designer</b>  |  |   |   |   |   |
| <p>I, <u>David DaCosta</u> declare that (choose one as appropriate):<br/>(print name)</p> <p><input type="checkbox"/> I review and take responsibility for the design work on behalf of a firm registered under subsection 3.2.4 Division C of the Building Code. I am qualified, and the firm is registered, in the appropriate classes/categories.</p> <p style="margin-left: 150px;">Individual BCIN: _____</p> <p style="margin-left: 150px;">Firm BCIN: _____</p> <p><input checked="" type="checkbox"/> I review and take responsibility for the design and am qualified in the appropriate category as an "other designer" under subsection 3.2.5 of Division C, of the Building Code.</p> <p style="margin-left: 150px;">Individual BCIN: <u>32964</u></p> <p style="margin-left: 150px;">Basis for exemption from registration: <u>Division C 3.2.4.1. (4)</u></p> <p><input type="checkbox"/> The design work is exempt from the registration and qualification requirements of the Building Code.</p> <p style="margin-left: 150px;">Basis for exemption from registration and qualification:</p> |  |   |   |   |   |
| <p>I certify that:</p> <ol style="list-style-type: none"> <li>The information contained in this schedule is true to the best of my knowledge.</li> <li>I have submitted this application with the knowledge and consent of the firm.</li> </ol>  |  |   |   |   |   |
| <u>July 31, 2023</u><br>Date   |  |   | <br>Signature of Designer |   |   |

## NOTE:

- For the purposes of this form, "individual" means the "person" referred to in Clause 3.2.4.7(1) d), of Division C, Article 3.2.5.1. of Division C and all other persons who are exempt from qualifications under Subsections 3.2.4 . and 3.2.5.of Division C.
- Schedule 1 does not require to be completed a holder of a license, temporary license, or a certificate of authorization, issued by the Ontario Association of Architects. Schedule 1 is also not required to be completed by a holder of a license to practise, a limited licence to practise, or a certificate of authorization, issued by the Association of Professional Engineers of Ontario.

| Heat loss and gain calculation summary sheet  |  |   |   | CSA-F280-M12 Standard<br>Form No. 1 |                         |
|---|--|---|---|-------------------------------------|-------------------------|
| These documents issued for the use of <b>EM Air Systems</b>   |  |   |   | Layout No.                          |                         |
| and may not be used by any other persons without authorization. Documents for permit and/or construction are signed in red. |  |   |   | <b>JB-09092</b>                     |                         |
| <b>Building Location</b>  |  |   |   |                                     |                         |
| Address (Model): <b>Model 3250 WOB</b>  |  |   | Site: <b>King East Developments</b>                                       |                                     |                         |
| Model:  |  |   | Lot:  |                                     |                         |
| City and Province: <b>Richmond Hill</b>   |  |   | Postal code:  |                                     |                         |
| <b>Calculations based on</b>  |  |   |   |                                     |                         |
| Dimensional information based on:   |  |   | <b>Architectural Design Inc.Mar/2023</b>                                  |                                     |                         |
| Attachment: <b>Detached</b>   |  |   | Front facing: <b>East/West</b>  |                                     | Assumed? <b>Yes</b>     |
| No. of Levels: <b>3</b> Ventilated? <b>Included</b>   |  |   | Air tightness: <b>1961-Present (ACH=3.57)</b>                             |                                     | Assumed? <b>Yes</b>     |
| Weather location: <b>Richmond Hill</b>  |  |   | Wind exposure: <b>Sheltered</b>   |                                     |                         |
| HRV? <b>VanEE</b> <b>V150E75NS</b>  |  |   | Internal shading: <b>Light-translucent</b>                                |                                     | Occupants: <b>5</b>     |
| Sensible Eff. at -25C <b>60%</b>  |  | Apparent Effect. at -0C <b>80%</b>  |   | Units: <b>Imperial</b>              | Area Sq ft: <b>3237</b> |
| Sensible Eff. at -0C <b>75%</b>   |  |   |   |                                     |                         |
| <b>Heating design conditions</b>  |  |   | <b>Cooling design conditions</b>  |                                     |                         |
| Outdoor temp <b>-5.8</b> Indoor temp: <b>72</b> Mean soil temp: <b>50</b>   |  |   | Outdoor temp <b>88</b> Indoor temp: <b>75</b> Latitude: <b>44</b>         |                                     |                         |
| <b>Above grade walls</b>  |  |   | <b>Below grade walls</b>  |                                     |                         |
| Style A: <b>As per OBC SB12</b> <b>Energy Star</b> <b>R 22 + 5ci</b>  |  |   | Style A: <b>As per OBC SB12</b> <b>Energy Star</b> <b>R 20ci</b>          |                                     |                         |
| Style B:  |  |   | Style B:  |                                     |                         |
| Style C:  |  |   | Style C:  |                                     |                         |
| Style D:  |  |   | Style D:  |                                     |                         |
| <b>Floors on soil</b>   |  |   | <b>Ceilings</b>   |                                     |                         |
| Style A: <b>As per Selected OBC SB12</b> <b>Energy Star</b>   |  |   | Style A: <b>As per Selected OBC SB12</b> <b>Energy Star</b> <b>R 60</b>   |                                     |                         |
| Style B:  |  |   | Style B: <b>As per Selected OBC SB12</b> <b>Energy Star</b> <b>R 31</b>   |                                     |                         |
| <b>Exposed floors</b>   |  |   | Style C:  |                                     |                         |
| Style A: <b>As per Selected OBC SB12</b> <b>Energy Star</b> <b>R 31</b>   |  |   | <b>Doors</b>  |                                     |                         |
| Style B:  |  |   | Style A: <b>As per Selected OBC SB12</b> <b>Energy Star</b> <b>R 4.00</b> |                                     |                         |
| <b>Windows</b>  |  |   | Style B:  |                                     |                         |
| Style A: <b>As per Selected OBC SB12</b> <b>Energy Star</b> <b>R 4.00</b>   |  |   | Style C:  |                                     |                         |
| Style B:  |  |   | <b>Skylights</b>  |                                     |                         |
| Style C:  |  |   | Style A: <b>As per Selected OBC SB12</b> <b>Energy Star</b> <b>R 2.03</b> |                                     |                         |
| Style D:  |  |   | Style B:  |                                     |                         |
| Attached documents: <b>As per Shedule 1</b>   |  | <b>Heat Loss/Gain Caculations based on CSA-F280-12 Effective R-Values</b> |   |                                     |                         |
| Notes: <b>Residential New Construction - Forced Air</b>   |  |   |   |                                     |                         |
| <b>Calculations performed by</b>  |  |   |   |                                     |                         |
| Name: <b>David DaCosta</b>  |  |   | Postal code: <b>L4T 0A4</b>   |                                     |                         |
| Company: <b>gtaDesigns Inc.</b>   |  |   | Telephone: <b>(905) 671-9800</b>  |                                     |                         |
| Address: <b>2985 Drew Road, Suite 202</b>   |  |   | Fax:  |                                     |                         |
| City: <b>Mississauga</b>  |  |   | E-mail <b>hvac@gtadesigns.ca</b>  |                                     |                         |

Builder: **EM Air Systems**

Date: **July 31, 2023**

I review and take responsibility for the design work and am qualified in the appropriate category as an "other designer" under Division C subsection 3.2.5. of the Building Code.

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Project: **King East Developments**

Model: **Model 3250 WOB**

**System 1**

Individual BCIN: 32964

David DaCosta

Project # **PJ-00267**  
Layout # **JB-09092**

| DESIGN LOAD SPECIFICATIONS     |              | AIR DISTRIBUTION & PRESSURE            |                 | FURNACE/AIR HANDLER DATA: |                  | BOILER/WATER HEATER DATA:       |          | A/C UNIT DATA: |          |
|--------------------------------|--------------|--|-----------------|---------------------------|------------------|---------------------------------|----------|----------------|----------|
| Level 1 Net Load               | 22,727 btu/h | Equipment External Static Pressure     | 0.5 "w.c.       | Make                      | Carrier          | Make                            | Type     | Carrier        | 3.0 Ton  |
| Level 2 Net Load               | 17,550 btu/h | Additional Equipment Pressure Drop     | 0.225 "w.c.     | Model                     | 59SC5B080E17--16 | Model                           |          | Cond.-----     | 3.0      |
| Level 3 Net Load               | 19,076 btu/h | Available Design Pressure              | 0.275 "w.c.     | Input Btu/h               | 80000            | Input Btu/h                     |          | Coil -----     | 3.0      |
| Level 4 Net Load               | 0 btu/h      | Return Branch Longest Effective Length | 300 ft          | Output Btu/h              | 78000            | Output Btu/h                    |          |                |          |
| Total Heat Loss                | 59,353 btu/h | R/A Plenum Pressure                    | 0.138 "w.c.     | E.s.p.                    | 0.50 " W.C.      | Min.Output Btu/h                | AWH      |                |          |
| Total Heat Gain                | 33,552 btu/h | S/A Plenum Pressure                    | 0.14 "w.c.      | Water Temp                | deg. F.          | Blower DATA:                    |          |                |          |
|                                |              | Heating Air Flow Proportioning Factor  | 0.0200 cfm/btuh | AFUE                      | 98%              | Blower Speed Selected:          | Blue     | Blower Type    | ECM      |
| Building Volume Vb             | 40235 ft³    | Cooling Air Flow Proportioning Factor  | 0.0353 cfm/btuh | Aux. Heat                 |                  | (Brushless DC OBC 12.3.1.5.(2)) |          |                |          |
| Ventilation Load               | 1,336 Btuh.  | R/A Temp                               | 70 deg. F.      | SB-12 Package             | Energy Star      | Check                           | 1185 cfm | Cool. Check    | 1185 cfm |
| Ventilation PVC                | 79.5 cfm     | S/A Temp                               | 131 deg. F.     |                           |                  | Heat.                           | 1185 cfm | Cooling        | 1185 cfm |
| Supply Branch and Grill Sizing |              | Diffuser loss                          | 0.01 "w.c.      | Temp. Rise>>>             | 61 deg. F.       |                                 |          | Design Airflow | 1185 cfm |

|                          | Level 1 |      |      |      |      |      |      |      |      |      |      |      |      |      | Level 2 |      |      |      |      |      |      |      |       |      |  |  |  |  |
|--------------------------|---------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------|------|------|------|------|------|------|------|-------|------|--|--|--|--|
| S/A Outlet No.           | 1       | 2    | 3    | 4    | 5    |      |      |      |      |      |      |      |      |      | 6       | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 25    |      |  |  |  |  |
| Room Use                 | BASE    | BASE | BASE | BASE | BASE |      |      |      |      |      |      |      |      |      | KIT     | KIT  | FAM  | LIV  | WR   | FOY  | LAUN | DIN  | STAIR |      |  |  |  |  |
| Btu/Outlet               | 4545    | 4545 | 4545 | 4545 | 4545 |      |      |      |      |      |      |      |      |      | 1775    | 1775 | 2528 | 1778 | 596  | 3687 | 2041 | 1522 | 1848  |      |  |  |  |  |
| Heating Airflow Rate CFM | 91      | 91   | 91   | 91   | 91   |      |      |      |      |      |      |      |      |      | 35      | 35   | 50   | 35   | 12   | 74   | 41   | 30   | 37    |      |  |  |  |  |
| Cooling Airflow Rate CFM | 29      | 29   | 29   | 29   | 29   |      |      |      |      |      |      |      |      |      | 76      | 76   | 85   | 93   | 12   | 49   | 45   | 81   | 10    |      |  |  |  |  |
| Duct Design Pressure     | 0.13    | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13    | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13  | 0.13 |  |  |  |  |
| Actual Duct Length       | 44      | 37   | 44   | 22   | 36   |      |      |      |      |      |      |      |      |      | 52      | 47   | 52   | 31   | 26   | 40   | 5    | 33   | 25    |      |  |  |  |  |
| Equivalent Length        | 140     | 110  | 80   | 100  | 110  | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 100  | 90      | 120  | 80   | 110  | 90   | 70   | 150  | 70   | 70    | 70   |  |  |  |  |
| Total Effective Length   | 184     | 147  | 124  | 122  | 146  | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 152  | 137     | 172  | 111  | 136  | 130  | 95   | 103  | 175  | 70    | 70   |  |  |  |  |
| Adjusted Pressure        | 0.07    | 0.09 | 0.10 | 0.11 | 0.09 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.09 | 0.09    | 0.08 | 0.12 | 0.10 | 0.10 | 0.14 | 0.13 | 0.07 | 0.19  | 0.19 |  |  |  |  |
| Duct Size Round          | 6       | 6    | 6    | 6    | 6    |      |      |      |      |      |      |      |      |      | 6       | 6    | 6    | 6    | 3    | 5    | 4    | 5    | 4     |      |  |  |  |  |
| Outlet Size              | 4x10    | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10    | 4x10 | 4x10 | 3x10 | 3x10 | 3x10 | 3x10 | 3x10 | 4x10  | 4x10 |  |  |  |  |
| Trunk                    | D       | C    | D    | C    | F    |      |      |      |      |      |      |      |      |      | D       | D    | D    | B    | B    | F    | PTO  | B    | E     |      |  |  |  |  |

|                          | Level 3 |      |      |       |       |       |       |       |       |      |       |      | Level 4 |      |      |      |      |      |      |      |      |      |      |  |
|--------------------------|---------|------|------|-------|-------|-------|-------|-------|-------|------|-------|------|---------|------|------|------|------|------|------|------|------|------|------|--|
| S/A Outlet No.           | 14      | 15   | 16   | 17    | 18    | 19    | 20    | 21    | 22    | 23   | 24    |      |         |      |      |      |      |      |      |      |      |      |      |  |
| Room Use                 | MAST    | MAST | ENS  | BED 4 | BATH2 | MEDIA | MEDIA | BED 3 | BED 3 | BATH | BED 2 |      |         |      |      |      |      |      |      |      |      |      |      |  |
| Btu/Outlet               | 1815    | 1815 | 1748 | 1135  | 771   | 2773  | 2773  | 1976  | 1976  | 859  | 1437  |      |         |      |      |      |      |      |      |      |      |      |      |  |
| Heating Airflow Rate CFM | 36      | 36   | 35   | 23    | 15    | 55    | 55    | 39    | 39    | 17   | 29    |      |         |      |      |      |      |      |      |      |      |      |      |  |
| Cooling Airflow Rate CFM | 60      | 60   | 50   | 36    | 16    | 68    | 68    | 55    | 55    | 12   | 31    |      |         |      |      |      |      |      |      |      |      |      |      |  |
| Duct Design Pressure     | 0.13    | 0.13 | 0.13 | 0.13  | 0.13  | 0.13  | 0.13  | 0.13  | 0.13  | 0.13 | 0.13  | 0.13 | 0.13    | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |  |
| Actual Duct Length       | 75      | 83   | 56   | 47    | 36    | 60    | 47    | 50    | 54    | 49   | 24    |      |         |      |      |      |      |      |      |      |      |      |      |  |
| Equivalent Length        | 130     | 120  | 150  | 110   | 140   | 120   | 110   | 120   | 130   | 140  | 100   | 70   | 70      | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 70   |  |
| Total Effective Length   | 205     | 203  | 206  | 157   | 176   | 180   | 157   | 170   | 184   | 189  | 124   | 70   | 70      | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 70   | 70   |  |
| Adjusted Pressure        | 0.06    | 0.06 | 0.06 | 0.08  | 0.07  | 0.07  | 0.08  | 0.08  | 0.07  | 0.07 | 0.10  | 0.19 | 0.19    | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 |      |  |
| Duct Size Round          | 5       | 5    | 5    | 4     | 3     | 6     | 6     | 5     | 5     | 3    | 4     |      |         |      |      |      |      |      |      |      |      |      |      |  |
| Outlet Size              | 3x10    | 3x10 | 3x10 | 3x10  | 3x10  | 4x10  | 4x10  | 3x10  | 3x10  | 3x10 | 3x10  | 4x10 | 4x10    | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 | 4x10 |  |
| Trunk                    | C       | C    | D    | B     | B     | F     | E     | E     | E     | E    | PTO   |      |         |      |      |      |      |      |      |      |      |      |      |  |

| Return Branch And Grill Sizing |      | Grill Pressure Loss |      | 0.02 "w.c. |      |      |      |      |      |      |      |
|--------------------------------|------|---------------------|------|------------|------|------|------|------|------|------|------|
| R/A Inlet No.                  | 1R   | 2R                  | 3R   | 4R         | 5R   | 6R   | 7R   | 8R   | 9R   | 10R  | 11R  |
| Inlet Air Volume CFM           | 227  | 393                 | 105  | 150        | 150  | 160  |      |      |      |      |      |
| Duct Design Pressure           | 0.12 | 0.12                | 0.12 | 0.12       | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| Actual Duct Length             | 19   | 33                  | 58   | 39         | 53   | 35   |      |      |      |      |      |
| Equivalent Length              | 115  | 175                 | 115  | 160        | 200  | 175  | 50   | 50   | 50   | 50   | 50   |
| Total Effective Length         | 134  | 208                 | 173  | 199        | 253  | 210  | 50   | 50   | 50   | 50   | 50   |
| Adjusted Pressure              | 0.09 | 0.06                | 0.07 | 0.06       | 0.05 | 0.06 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| Duct Size Round                | 8.0  | 11.0                | 6.0  | 8.0        | 8.0  | 8.0  |      |      |      |      |      |
| Inlet Size                     | FLC  | 8                   | 8    | 8          | 8    | 8    |      |      |      |      |      |
| " "                            | OR   | x                   | x    | x          | x    | x    | x    | x    | x    | x    | x    |
| Inlet Size                     | 9x6  | 30                  | 14   | 14         | 14   | 14   |      |      |      |      |      |
| Trunk                          | Y    | Y                   | Z    | Z          | Y    | Y    |      |      |      |      |      |

| Return Trunk Duct Sizing |      |        |       |            |       |  |  |
|--------------------------|------|--------|-------|------------|-------|--|--|
| Trunk                    | CFM  | Press. | Round | Rect. Size |       |  |  |
| Drop                     | 1185 | 0.05   | 17.0  | 24x12      |       |  |  |
| Z                        | 1185 | 0.05   | 17.0  | 26x10      | 22x12 |  |  |
| Y                        | 930  | 0.05   | 15.5  | 28x8       | 22x10 |  |  |
| X                        |      |        |       |            |       |  |  |
| W                        |      |        |       |            |       |  |  |
| V                        |      |        |       |            |       |  |  |
| U                        |      |        |       |            |       |  |  |
| T                        |      |        |       |            |       |  |  |
| S                        |      |        |       |            |       |  |  |
| R                        |      |        |       |            |       |  |  |
| Q                        |      |        |       |            |       |  |  |

| Supply Trunk Duct Sizing |       |       |        |       |            |       |  |
|--------------------------|-------|-------|--------|-------|------------|-------|--|
| Trunk                    | C.CFM | H.CFM | Press. | Round | Rect. Size |       |  |
| A                        | 1108  | 1116  | 0.06   | 16.0  | 30x8       | 22x10 |  |
| B                        | 762   | 708   | 0.06   | 14.0  | 22x8       | 18x10 |  |
| C                        | 523   | 592   | 0.06   | 13.0  | 18x8       | 14x10 |  |
| D                        | 345   | 338   | 0.06   | 10.5  | 12x8       | 10x10 |  |
| E                        | 346   | 408   | 0.07   | 11.0  | 14x8       | 10x10 |  |
| F                        | 146   | 220   | 0.07   | 8.5   | 8x8        | 107   |  |
| G                        |       |       |        |       |            |       |  |
| H                        |       |       |        |       |            |       |  |
| I                        |       |       |        |       |            |       |  |
| J                        |       |       |        |       |            |       |  |
| K                        |       |       |        |       |            |       |  |

Builder: EM Alr Systems

Date: July 31, 2023

Weather Data Richmond Hill 44 -5.8 88 20 50

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2012 OBC

Project: King East Developments

Model: Model 3250 WOB

System 1

Heat Loss ^T 77.8 deg. F Ht gain ^T 12.8 deg. F

Project # PJ-00267  
Layout # JB-09092

| Level 1                        |                |                         |        | BASE   |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
|--------------------------------|----------------|-------------------------|--------|--------|------|------|----|------|----|------|----|------|----|------|----|------|----|------|----|
| Run ft. exposed wall A         | 146            | A                       |        | A      |      | A    |    | A    |    | A    |    | A    |    | A    |    | A    |    | A    |    |
| Run ft. exposed wall B         | 35             | B                       |        | B      |      | B    |    | B    |    | B    |    | B    |    | B    |    | B    |    | B    |    |
| Ceiling height                 | 6.0            | AG                      |        | 6.0    | AG   | 6.0  | AG | 6.0  | AG | 6.0  | AG | 6.0  | AG | 6.0  | AG | 6.0  | AG | 6.0  | AG |
| Floor area                     | 1335           | Area                    |        | Area   |      | Area |    | Area |    | Area |    | Area |    | Area |    | Area |    | Area |    |
| Exposed Ceilings A             | A              |                         |        | A      |      | A    |    | A    |    | A    |    | A    |    | A    |    | A    |    | A    |    |
| Exposed Ceilings B             | B              |                         |        | B      |      | B    |    | B    |    | B    |    | B    |    | B    |    | B    |    | B    |    |
| Exposed Floors                 | Flr            |                         |        | Flr    |      | Flr  |    | Flr  |    | Flr  |    | Flr  |    | Flr  |    | Flr  |    | Flr  |    |
| Gross Exp Wall A               | 876            |                         |        |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Gross Exp Wall B               | 315            |                         |        |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Components                     | R-Values       | Loss                    | Gain   | Loss   |      | Loss |    | Loss |    | Loss |    | Loss |    | Loss |    | Loss |    | Loss |    |
| North Shaded                   | 4.00           | 19.45                   | 11.73  | 5      | 97   | 59   |    |      |    |      |    |      |    |      |    |      |    |      |    |
| East/West                      | 4.00           | 19.45                   | 29.66  |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| South                          | 4.00           | 19.45                   | 22.60  | 10     | 195  | 226  |    |      |    |      |    |      |    |      |    |      |    |      |    |
| WOB Windows Including Doors    | 4.00           | 19.45                   | 27.86  | 64     | 1245 | 1783 |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Skylight                       | 2.03           | 38.33                   | 89.12  |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Doors                          | 4.00           | 19.45                   | 3.20   | 21     | 408  | 67   |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Net exposed walls A            | 20.84          | 3.73                    | 0.61   | 840    |      | 516  |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Net exposed walls B            | 21.40          | 3.64                    | 0.60   | 251    |      | 150  |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Exposed Ceilings A             | 59.22          | 1.31                    | 0.67   |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Exposed Ceilings B             | 27.65          | 2.81                    | 1.44   |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Exposed Floors                 | 29.80          | 2.61                    | 0.23   |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Foundation Conductive Heatloss |                |                         |        |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Total Conductive               | Heat Loss      |                         |        |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
|                                | Heat Gain      |                         |        |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Air Leakage                    | Heat Loss/Gain | 0.9556                  | 0.0603 |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Ventilation                    | Case 1         |                         | 0.06   |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
|                                | Case 2         |                         | 16.80  |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
|                                | Case 3         | x                       | 0.04   |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Heat Gain People               |                |                         | 239    |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Appliances Loads               | 1 = 25 percent |                         | 5398   |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Duct and Pipe loss             |                |                         | 10%    |        |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Level HL Total                 | 22,727         | Total HL for per room   |        | 22,727 |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| Level HG Total                 | 4,101          | Total HG per room x 1.3 |        |        |      | 4101 |    |      |    |      |    |      |    |      |    |      |    |      |    |

| Level 2                        |  |  |  | KIT            |                         | DIN    |       | LAUN |      | FOY  |      | STAIR |      | WR   |      | LIV  |      | FAM  |      | A    |      | A    |      | A    |      |      |      |      |     |     |  |
|--------------------------------|--|--|--|----------------|-------------------------|--------|-------|------|------|------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|--|
| Run ft. exposed wall A         |  |  |  | 36             | A                       | 14     | A     | 19   | A    | 40   | A    | 18    | A    | 6    | A    | 20   | A    | 29   | A    | A    | B    | A    | B    | A    | B    |      |      |      |     |     |  |
| Run ft. exposed wall B         |  |  |  | B              |                         | B      |       | B    |      | B    |      | B     |      | B    |      | B    |      | B    |      | B    |      | B    |      | B    |      |      |      |      |     |     |  |
| Ceiling height                 |  |  |  | 10.0           |                         | 10.0   |       | 11.0 |      | 10.0 |      | 12.0  |      | 10.0 |      | 10.0 |      | 10.0 |      | 10.0 |      | 10.0 |      | 10.0 |      |      |      |      |     |     |  |
| Floor area                     |  |  |  | 292            | Area                    | 178    | Area  | 82   | Area | 152  | Area | 90    | Area | 41   | Area | 286  | Area | 200  | Area | Area |      | Area |      | Area |      |      |      |      |     |     |  |
| Exposed Ceilings A             |  |  |  | A              |                         | A      |       | A    |      | A    |      | A     |      | A    |      | A    |      | A    |      | A    |      | A    |      | A    |      |      |      |      |     |     |  |
| Exposed Ceilings B             |  |  |  | B              |                         | B      |       | B    |      | B    |      | B     |      | B    |      | B    |      | B    |      | B    |      | B    |      | B    |      |      |      |      |     |     |  |
| Exposed Floors                 |  |  |  | Flr            |                         | Flr    |       | Flr  |      | Flr  |      | Flr   |      | Flr  |      | Flr  |      | Flr  |      | Flr  |      | Flr  |      | Flr  |      |      |      |      |     |     |  |
| Gross Exp Wall A               |  |  |  | 360            |                         | 140    |       | 209  |      | 400  |      | 216   |      | 60   |      | 200  |      | 290  |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Gross Exp Wall B               |  |  |  |                |                         |        |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Components                     |  |  |  | R-Values       | Loss                    | Gain   | Loss  | Gain | Loss | Gain | Loss | Gain  | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain |      |      |     |     |  |
| North Shaded                   |  |  |  | 4.00           | 19.45                   | 11.73  |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| East/West                      |  |  |  | 4.00           | 19.45                   | 29.66  | 53    | 1031 | 1572 |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| South                          |  |  |  | 4.00           | 19.45                   | 22.60  |       |      |      |      |      |       | 22   | 428  | 653  |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Existing Windows               |  |  |  | 1.99           | 39.10                   | 24.56  |       |      |      |      |      |       |      |      |      |      | 9    | 175  | 203  | 22   | 428  | 497  |      |      |      |      |      |      |     |     |  |
| Skylight                       |  |  |  | 2.03           | 38.33                   | 89.12  |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Doors                          |  |  |  | 4.00           | 19.45                   | 3.20   |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Net exposed walls A            |  |  |  | 21.40          | 3.64                    | 0.60   | 307   | 1116 | 184  | 114  | 414  | 68    | 179  | 651  | 107  | 351  | 1276 | 210  | 195  | 709  | 117  | 51   | 185  | 31   | 178  | 647  | 106  | 260  | 945 | 156 |  |
| Net exposed walls B            |  |  |  | 8.50           | 9.15                    | 1.51   |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Exposed Ceilings A             |  |  |  | 59.22          | 1.31                    | 0.67   |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Exposed Ceilings B             |  |  |  | 27.65          | 2.81                    | 1.44   |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Exposed Floors                 |  |  |  | 29.80          | 2.61                    | 0.23   |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Foundation Conductive Heatloss |  |  |  |                |                         | x      |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Total Conductive               |  |  |  | Heat Loss      |                         |        | 2147  |      |      | 920  |      |       | 1234 |      |      | 2229 |      |      | 1117 |      |      | 360  |      |      | 1075 |      |      | 1529 |     |     |  |
|                                |  |  |  | Heat Gain      |                         |        |       | 1756 |      | 373  |      | 280   |      |      | 949  |      |      |      | 184  |      |      |      | 234  |      | 604  |      |      | 1045 |     |     |  |
| Air Leakage                    |  |  |  | Heat Loss/Gain | 0.6160                  | 0.0603 | 1322  | 106  |      | 567  | 23   |       | 760  | 17   |      | 1373 | 57   |      | 688  | 11   |      | 222  | 14   |      | 662  | 36   |      | 942  | 63  |     |  |
| Ventilation                    |  |  |  | Case 1         |                         | 0.04   |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
|                                |  |  |  | Case 2         |                         | 16.80  | 13.82 |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
|                                |  |  |  | Case 3         | x                       | 0.04   | 0.07  |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
|                                |  |  |  |                |                         |        |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Heat Gain People               |  |  |  |                |                         | 239    |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Appliances Loads               |  |  |  | 1 =25 percent  |                         | 5398   | 1.0   |      | 1349 | 1.0  |      | 1349  | 0.5  |      | 675  |      |      |      |      |      |      |      | 1.0  |      | 1349 | 0.5  |      | 675  |     |     |  |
| Duct and Pipe loss             |  |  |  |                |                         | 10%    |       |      |      |      |      |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |  |
| Level HL Total                 |  |  |  | 17,550         | Total HL for per room   |        |       |      | 3551 |      |      | 1522  |      | 2041 |      | 3687 |      |      | 1848 |      |      | 596  |      | 1778 |      | 2528 |      |      |     |     |  |
| Level HG Total                 |  |  |  | 14,959         | Total HG per room x 1.3 |        |       |      |      | 4325 |      | 2300  |      | 1287 |      | 1389 |      | 269  |      |      |      |      | 343  |      | 2638 |      | 2408 |      |     |     |  |

I review and take responsibility for the design work and am qualified in the appropriate category as an "other designer" under

Division C subsection 3.2.5. of the Building Code. Individual BCIN:

32964

*Handwritten signature*

David DaCosta

SB-12 Package

Energy Star

|                 |        |       |
|-----------------|--------|-------|
| Total Heat Loss | 59,353 | btu/h |
| Total Heat Gain | 33,552 | btu/h |

2012 OBC

Builder: EM Air Systems

Date: July 31, 2023

Project: King East Developments

Model: Model 3250 WOB

System 1

Weather Data Richmond Hill 44 -5.8 88 20 50

Heat Loss ^T 77.8 deg. F Ht gain ^T 12.8 deg. F

Project # PJ-00267  
Layout # JB-09092

## Level 3

|                        | MAST     | BED 2    | BATH     | BED 3    | MEDIA    | BATH2   | BED 4    | ENS      |      |  |      |      |      |
|------------------------|----------|----------|----------|----------|----------|---------|----------|----------|------|--|------|------|------|
| Run ft. exposed wall A | 41 A     | 17 A     | 6 A      | 29 A     | 46 A     | 9 A     | 12 A     | 21 A     | A    |  | A    | A    | A    |
| Run ft. exposed wall B | B        | B        | B        | B        | B        | B       | B        | B        | B    |  | B    | B    | B    |
| Ceiling height         | 9.0      | 9.0      | 9.0      | 11.0     | 11.0     | 9.0     | 9.0      | 9.0      | 9.0  |  | 9.0  | 9.0  | 9.0  |
| Floor area             | 425 Area | 185 Area | 109 Area | 183 Area | 390 Area | 97 Area | 165 Area | 102 Area | Area |  | Area | Area | Area |
| Exposed Ceilings A     | 425 A    | 185 A    | 109 A    | 183 A    | 390 A    | 97 A    | 165 A    | 102 A    | A    |  | A    | A    | A    |
| Exposed Ceilings B     | B        | B        | B        | B        | B        | B       | B        | B        | B    |  | B    | B    | B    |
| Exposed Floors         | Flr      | Flr      | 35 Flr   | 183 Flr  | 117 Flr  | Flr     | Flr      | Flr      | Flr  |  | Flr  | Flr  | Flr  |
| Gross Exp Wall A       | 369      | 153      | 54       | 319      | 506      | 81      | 108      | 189      |      |  |      |      |      |
| Gross Exp Wall B       |          |          |          |          |          |         |          |          |      |  |      |      |      |

| Components                     | R-Values       | Loss   | Gain   | Loss  | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain |
|--------------------------------|----------------|--------|--------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| North Shaded                   | 4.00           | 19.45  | 11.73  |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| East/West                      | 4.00           | 19.45  | 29.66  | 48    | 934  | 1424 |      |      |      |      |      |      |      |      |      |      |      |      |      |
| South                          | 4.00           | 19.45  | 22.60  |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Existing Windows               | 1.99           | 39.10  | 24.56  |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Skylight                       | 2.03           | 38.33  | 89.12  |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Doors                          | 4.00           | 19.45  | 3.20   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Net exposed walls A            | 21.40          | 3.64   | 0.60   | 321   | 1167 | 192  | 137  | 498  | 82   | 45   | 164  | 27   | 271  | 985  | 162  | 440  | 1600 | 263  | 72   |
| Net exposed walls B            | 8.50           | 9.15   | 1.51   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Exposed Ceilings A             | 59.22          | 1.31   | 0.67   | 425   | 558  | 286  | 185  | 243  | 124  | 109  | 143  | 73   | 183  | 240  | 123  | 390  | 512  | 262  | 97   |
| Exposed Ceilings B             | 27.65          | 2.81   | 1.44   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Exposed Floors                 | 29.80          | 2.61   | 0.23   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Foundation Conductive Heatloss |                |        |        |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Total Conductive               |                |        |        |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Air Leakage                    | Heat Loss/Gain | 0.3277 | 0.0603 |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Ventilation                    | Case 1         |        | 0.02   | 0.07  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|                                | Case 2         |        | 16.80  | 13.82 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|                                | Case 3         | x      | 0.04   | 0.07  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Heat Gain People               |                |        | 239    |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Appliances Loads               | 1 =.25 percent |        | 5398   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Duct and Pipe loss             |                |        | 10%    |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Level HL Total                 | 19,076         |        |        |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Level HG Total                 | 14,491         |        |        |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

## Level 4

|                        |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Run ft. exposed wall A | A    | A    | A    | A    | A    | A    | A    | A    | A    | A    | A    | A    | A    |
| Run ft. exposed wall B | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    |
| Ceiling height         |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Floor area             | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area | Area |
| Exposed Ceilings A     | A    | A    | A    | A    | A    | A    | A    | A    | A    | A    | A    | A    | A    |
| Exposed Ceilings B     | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    | B    |
| Exposed Floors         | Flr  | Flr  | Flr  | Flr  | Flr  | Flr  | Flr  | Flr  | Flr  | Flr  | Flr  | Flr  | Flr  |
| Gross Exp Wall A       |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Gross Exp Wall B       |      |      |      |      |      |      |      |      |      |      |      |      |      |

| Components                     | R-Values       | Loss   | Gain   | Loss  | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain | Loss | Gain |
|--------------------------------|----------------|--------|--------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| North Shaded                   | 4.00           | 19.45  | 11.73  |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| East/West                      | 4.00           | 19.45  | 29.66  |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| South                          | 4.00           | 19.45  | 22.60  |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Existing Windows               | 1.99           | 39.10  | 24.56  |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Skylight                       | 2.03           | 38.33  | 89.12  |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Doors                          | 4.00           | 19.45  | 3.20   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Net exposed walls A            | 21.40          | 3.64   | 0.60   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Net exposed walls B            | 8.50           | 9.15   | 1.51   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Exposed Ceilings A             | 59.22          | 1.31   | 0.67   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Exposed Ceilings B             | 27.65          | 2.81   | 1.44   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Exposed Floors                 | 29.80          | 2.61   | 0.23   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Foundation Conductive Heatloss |                |        |        |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Total Conductive               |                |        |        |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Air Leakage                    | Heat Loss/Gain | 0.0000 | 0.0603 |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Ventilation                    | Case 1         |        | 0.00   | 0.07  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|                                | Case 2         |        | 16.80  | 13.82 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|                                | Case 3         | x      | 0.04   | 0.07  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Heat Gain People               |                |        | 239    |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Appliances Loads               | 1 =.25 percent |        | 5398   |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Duct and Pipe loss             |                |        | 10%    |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Level HL Total                 | 0              |        |        |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Level HG Total                 | 0              |        |        |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

I review and take responsibility for the design work and am qualified in the appropriate category as an "other designer" under

Division C subsection 3.2.5. of the Building Code. Individual BCIN:

32964

David DaCosta

SB-12 Package

Energy Star

|                 |        |       |
|-----------------|--------|-------|
| Total Heat Loss | 59,353 | btu/h |
| Total Heat Gain | 33,552 | btu/h |

I review and take responsibility for the design work and am qualified in the appropriate category as an "other designer" under Division C subsection 3.2.5. of the Building Code.

Individual BCIN: 32964



David DaCosta

**Package:** Energy Star  
**Project:** Richmond Hill  
**Model:** Model 3250 WOB

## RESIDENTIAL MECHANICAL VENTILATION DESIGN SUMMARY

*For systems serving one dwelling unit & conforming to the Ontario Building Code, O.reg 332/12*

| Location of Installation |               |
|--------------------------|---------------|
| Lot #                    | Plan #        |
| Township                 | Richmond Hill |
| Roll #                   | Permit #      |
| Address                  |               |

| Builder |                |
|---------|----------------|
| Name    | EM Air Systems |
| Address |                |
| City    |                |
| Tel     | Fax            |

| Installing Contractor |     |
|-----------------------|-----|
| Name                  |     |
| Address               |     |
| City                  |     |
| Tel                   | Fax |

| Combustion Appliances 9.32.3.1(1) |   |  |
|-----------------------------------|---|--|
| a)                                | x | Direct vent (sealed combustion) only               |
| b)                                |   | Positive venting induced draft (except fireplaces) |
| c)                                |   | Natural draft, B-vent or induced draft fireplaces  |
| d)                                |   | Solid fuel (including fireplaces)                  |
| e)                                |   | No combustion Appliances                           |

| Heating System |  |  |
|----------------|--|--|
| x              | Forced air                                     |  |
|                | Non forced air                                 |  |
|                | Electric space heat (if over 10% of heat load) |  |

| House Type 9.32.3.1(2) |   |   |
|------------------------|---|---|
| I                      | x | Type a) or b) appliances only, no solid fuel        |
| II                     |   | Type I except with solid fuel (including fireplace) |
| III                    |   | Any type c) appliance                               |
| IV                     |   | Type I or II either electric space heat             |
| Other                  |   | Type I, II or IV no forced air                      |

| System Design Option |   |  |
|----------------------|---|--|
| 1                    | Exhaust only / forced air system                  |  |
| 2                    | HRV WITH DUCTING / forced air system              |  |
| 3                    | HRV simplified connection to forced air system    |  |
| 4                    | HRV full ducting/not coupled to forced air system |  |
|                      | Part 6 design                                     |  |

| Total Ventilation Capacity 9.32.3.3(1) |              |          |  |
|--|--------------|----------|--|
| Bsmt & Master Bdrm                     | 2 @ 21.2 cfm | 42.4 cfm |  |
| Other Bedrooms                         | 3 @ 10.6 cfm | 31.8 cfm |  |
| Bathrooms & Kitchen                    | 5 @ 10.6 cfm | 53 cfm   |  |
| Other rooms                            | 6 @ 10.6 cfm | 63.6 cfm |  |
| Total                                  |              | 190.8    |  |

| Principal Ventilation Capacity 9.32.3.4(1) |              |          |  |
|--|--------------|----------|--|
| Master bedroom                             | 1 @ 31.8 cfm | 31.8 cfm |  |
| Other bedrooms                             | 3 @ 15.9 cfm | 47.7 cfm |  |
| Total                                      |              | 79.5     |  |

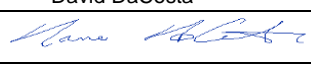
| Principal Exhaust Fan Capacity |           |            |           |
|--------------------------------|-----------|------------|-----------|
| Make                           | Model     | Location   |           |
| VanEE                          | V150E75NS | Base       |           |
| 127 cfm                        |           | 80.0 Sones | or Equiv. |

| Heat Recovery Ventilator        |              |            |  |
|---------------------------------|--------------|------------|--|
| Make                            | VanEE        |            |  |
| Model                           | V150E75NS    |            |  |
|                                 | 127 cfm high | 80 cfm low |  |
| Sensible efficiency @ -25 deg C |              | 60%        |  |
| Sensible efficiency @ 0 deg C   |              | 75%        |  |

Note: Installer to balance HRV/ERV to within 10 percent of PVC

| Supplemental Ventilation Capacity    |           |
|--------------------------------------|-----------|
| Total ventilation capacity           | 190.8     |
| Less principal exhaust capacity      | 79.5      |
| REQUIRED supplemental vent. Capacity | 111.3 cfm |

| Supplemental Fans 9.32.3.5. |     |       |                 |
|-----------------------------|-----|-------|-----------------|
| Location                    | cfm | Model | Sones           |
| Ens                         | 50  | XB50  | 0.3             |
| Bath                        | 50  | XB50  | 0.3             |
| Bath 2                      | 50  | XB50  | 0.3             |
| all fans HVI listed         |     | Make  | Broan or Equiv. |

| Designer Certification  |   |        |       |
|---|---|--------|-------|
| I hereby certify that this ventilation system has been designed in accordance with the Ontario Building Code. |   |        |       |
| Name  | David DaCosta   |        |       |
| Signature   |  |        |       |
| HRAI #  | 5190  | BCIN # | 32964 |
| Date  | July 31, 2023   |        |       |



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e-mail dave@gtadesigns.ca

## Energy Efficiency Design Summary: Performance & Other Acceptable Compliance Methods (Building Code Part 9, Residential)

Page 7  
Project # PJ-00267  
Layout # JB-09092

This form is used by a designer to demonstrate that the energy efficiency design of a house complies with the building code using the Performance or Other Acceptable Compliance Methods described in Subsections 3.1.2. and 3.1.3. of SB-12,

This form must accurately reflect the information contained on the drawings and specifications being submitted. Refer to Supplementary Standard SB-12 for details about building code compliance requirements. Further information about energy efficiency requirements for new buildings is available from the provincial building code website or the municipal building department.

For use by Principal Authority

|                 |                            |
|-----------------|----------------------------|
| Application No: | Model/Certification Number |
|-----------------|----------------------------|

### A. Project Information

|                              |             |                                      |
|------------------------------|-------------|--------------------------------------|
| Building number, street name | Unit number | Lot/Con                              |
| Model 3250 WOB               |             |                                      |
| Municipality                 | Postal code | Reg. Plan number / other description |
| Richmond Hill                |             |                                      |

### B. Prescriptive Compliance [indicate the building code compliance option being employed in the house design]

|  |   |
|--|---|
| <input type="checkbox"/> SB-12 Performance* [SB-12 - 3.1.2.]       | *Attach energy performance results using an approved software (see guide) |
| <input checked="" type="checkbox"/> ENERGY STAR** [SB-12 - 3.1.3.] | *Attach Builder Option Package [BOP] form                                 |
| <input type="checkbox"/> R-2000** [SB-12 - 3.1.3.]                 | *Attach R-2000 HOT2000 Report   |

### C. Project Building Design Conditions

| Climatic Zone (SB-1):  | Heat. Equip. Efficiency   | Space Heating Fuel Source  |
|--|---|--|
| <input checked="" type="checkbox"/> Zone 1 (< 5000 degree days)                | <input checked="" type="checkbox"/> ≥ 92% AFUE  | <input checked="" type="checkbox"/> Gas <input type="checkbox"/> Propane <input type="checkbox"/> Solid Fuel |
| <input type="checkbox"/> Zone 2 (≥ 5000 degree days)                           | <input type="checkbox"/> ≥ 84% < 92% AFUE   | <input type="checkbox"/> Oil <input type="checkbox"/> Electric <input type="checkbox"/> Earth Energy         |
| Ratio of Windows, Skylights & Glass (W, S & G) to Wall Area                    | Other Building Characteristics  |  |
| Area of Walls = <u>450.1</u> m <sup>2</sup> or <u>4844.9</u> ft <sup>2</sup>   | <input type="checkbox"/> Log/Post&Beam <input type="checkbox"/> ICF Above Grade <input type="checkbox"/> ICF Basement |  |
| Area of W, S & G = <u>45.43</u> m <sup>2</sup> or <u>489.0</u> ft <sup>2</sup> | <input type="checkbox"/> Slab-on-ground <input checked="" type="checkbox"/> Walkout Basement                          |  |
|  | <input checked="" type="checkbox"/> Air Conditioning <input type="checkbox"/> Combo Unit                              |  |
|  | <input type="checkbox"/> Air Sourced Heat Pump (ASHP)   |  |
| <input type="checkbox"/> Ground Source Heat Pump (GSHP)                        |   |  |

|   |
|---|
| SB-12 Performance Reference Building Design Package indicating the prescriptive package to be compared for compliance |
| SB-12 Referenced Building Package (input design package):   |

### D. Building Specifications [provide values and ratings of the energy efficiency components proposed, or attach ENERGY STAR BOP form]

| Building Component                       | Minimum RSI/R-Values or Maximum U-Value <sup>1</sup> |           | Building Component  | Efficiency Ratings |
|--|--|-----------|---|--------------------|
| Thermal Insulation                       | Nominal  | Effective | Windows & Doors Provide U-Value <sup>(1)</sup> or ER rating |                    |
| Ceiling with Attic Space                 | 60   | 59.22     | Windows/Sliding Glass Doors                                 | 1.4                |
| Ceiling without Attic Space              | 31   | 27.65     | Skylights   | 2.8                |
| Exposed Floor                            | 31   | 29.80     | Mechanicals   |                    |
| Walls Above Grade                        | 22 +5.0ci  | 21.40     | Heating Equip.(AFUE)  | 96%                |
| Basement Walls                           | 20.0ci   | 20.84     | HRV Efficiency (SRE% at 0°C)                                | 75%                |
| Slab (all >600mm below grade)            | x  | x         | DHW Heater (EF)   | 0.95               |
| Slab (edge only ≤600mm below grade)      | 10   | 11.13     | DWHR (CSA B55.1 (min. 42% efficiency))                      | 42.0% #Showers 2   |
| Slab (all ≤600mm below grade, or heated) | 10   | 11.13     | Combined Heating System                                     |                    |

(1) U value to be provided in either W/(m<sup>2</sup>·K) or Btu/(h·ft<sup>2</sup>·F) but not both.



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**Energy Efficiency Design Summary:  
Performance & Other Acceptable Compliance Methods  
(Building Code Part 9, Residential)**

Page 8  
Project # PJ-00267  
Layout # JB-09092

**E. Project Design Verification** [Subsection 3.1.2. Performance Compliance]

The annual energy consumption using Subsection 3.1.1. SB-12 Reference Building Package is \_\_\_\_\_ GJ (1J=1000MJ)

The annual energy consumption of this house as designed is \_\_\_\_\_ GJ

The software used to simulate the annual energy use of the building is: \_\_\_\_\_

The building is being designed using an air tightness baseline of:

- ☐ OBC reference ACH, NLA or NLR default values (no depressurization test required)
- ☐ Targeted ACH, NLA or NLR. Depressurization test to meet \_\_\_\_\_ ACH50 or NLR or NLA
- ☐ Reduction of overall thermal performance of the proposed building envelope is not more than 25% of the envelope of the compliance package it is compared against (3.1.2.1.(6)).
- ☐ Standard Operating Conditions Applied (A-3.1.2.1 - 4.6.2)
- ☐ Reduced Operating Conditions for Zero-rated homes Applied (A-3.1.2.1 - 4.6.2.5)

☐ On Site Renewable(s): Solar: \_\_\_\_\_  
Other Types: \_\_\_\_\_

**F. ENERGY STAR or R-2000 Performance Design Verification** [Subsection 3.1.3. Other Acceptable Compliance Methods]

- ☐ The NRCAN "ENERGY STAR for New Homes Standard Version 12.6" technical requirements, applied to this building design result in the building performance meeting or exceeding the prescriptive performance requirements of the Supplementary Standard SB12 (A-3.1.3.1).
- ☐ The NRCAN, "2012 R-2000 Standard" technical requirements, applied to this building design result in the building performance meeting or exceeding the prescriptive performance requirements of the Supplementary Standard SB12 (A-3.1.3.1).

**Performance Energy Modeling Professional**

Energy Evaluator/Advisor/Rater/CEM Name and company: BUILDING KNOWLEDGE CANADA  
Accreditation or Evaluator/Advisor/Rater License #: 5506

**ENERGY STAR or R-2000**

Energy Evaluator/Advisor/Rater/Name and company: ANGELA BUSTAMANTE  
Evaluator/Advisor/Rater License #: 5506

**G. Designer(s)** [name(s) & BCIN(s), if applicable, of person(s) providing information herein to substantiate that design meets building code]

| Name          | BCIN  | Signature |
|---------------|-------|-----------|
| David DaCosta | 32964 |           |



**Package:** Energy Star      **System:** System 1  
**Project:** Richmond Hill      **Model:** Model 3250 WOB

## Air Leakage Calculations

| Building Air Leakage Heat Loss |        |       |      |        |
|--------------------------------|--------|-------|------|--------|
| B                              | LRairh | Vb    | HL^T | HLleak |
| 0.018                          | 0.387  | 40235 | 77.8 | 21789  |

| Building Air Leakage Heat Gain |        |       |      |         |
|--------------------------------|--------|-------|------|---------|
| B                              | LRairh | Vb    | HG^T | HG Leak |
| 0.018                          | 0.108  | 40235 | 12.8 | 1005    |

| Air Leakage Heat Loss/Gain Multiplier Table (Section 11) |                   |              |                                       |                                  |
|--|-------------------|--------------|---------------------------------------|----------------------------------|
| Level  | Level Factor (LF) | Building Air | Level Conductive Heat Loss (HLclevel) | Air Leakage Heat Loss Multiplier |
| Level 1  | 0.5               | 21789        | 11401                                 | 0.9556                           |
| Level 2  | 0.3               |              | 10612                                 | 0.6160                           |
| Level 3  | 0.2               |              | 13297                                 | 0.3277                           |
| Level 4  | 0                 |              | 0                                     | 0.0000                           |

| Levels |      |      |      |
|--------|------|------|------|
| 1      | 2    | 3    | 4    |
| (LF)   | (LF) | (LF) | (LF) |
| 1.0    | 0.6  | 0.5  | 0.4  |
|        | 0.4  | 0.3  | 0.3  |
|        |      | 0.2  | 0.2  |
|        |      |      | 0.1  |

| HG LEAK                       |       | Air Leakage Heat Gain |        |
|-------------------------------|-------|-----------------------|--------|
|                               | 1005  |                       | 0.0603 |
| BUILDING CONDUCTIVE HEAT GAIN |       |                       |        |
|                               | 16652 |                       |        |

| Levels this Dwelling |   |
|----------------------|---|
|                      | 3 |

| Highest Ceiling Height |  | 28.0 FT | 8.53 M |
|------------------------|--|---------|--------|
|------------------------|--|---------|--------|

## Ventilation Calculations

| Vent    | Ventilation Heat Loss                         |      |           |              |            | Ventilation Heat Gain                         |        |                |            | Vent |
|---------|---|------|-----------|--------------|------------|---|--------|----------------|------------|------|
|         | Ventilation Heat Loss                         |      |           |              |            | Ventilation Heat Gain                         |        |                |            |      |
|         | C   | PVC  | HL^T      | (1-E) HRV    | HLbvent    | C   | PVC    | HG^T           | HGbvent    |      |
|         | 1.08  | 79.5 | 77.8      | 0.20         | 1336       | 1.1   | 79.5   | 12.8           | 1099       |      |
| Case 1  |   |      |           |              |            | Case 1  |        |                |            |      |
| Case 1  | Ventilation Heat Loss (Exhaust only Systems)  |      |           |              |            | Ventilation Heat Gain (Exhaust Only Systems)  |        |                |            |      |
|         | Case 1 - Exhaust Only                         |      |           |              |            | Case 1 - Exhaust Only                         |        | Multiplier     |            |      |
|         | Level   | LF   | HLbvent   | LVL Cond. HL | Multiplier | HGbvent                                       | 1099   | 0.07           |            |      |
|         | Level 1                                       | 0.5  | 1336      | 11401        | 0.06       | Building                                      | 16652  |                |            |      |
|         | Level 2                                       | 0.3  |           | 10612        | 0.04       |   |        |                |            |      |
|         | Level 3                                       | 0.2  |           | 13297        | 0.02       |   |        |                |            |      |
| Level 4 | 0   | 0    |           | 0.00         |            |   |        |                |            |      |
| Case 2  |   |      |           |              |            | Case 2  |        |                |            |      |
| Case 2  | Ventilation Heat Loss (Direct Ducted Systems) |      |           |              |            | Ventilation Heat Gain (Direct Ducted Systems) |        |                |            |      |
|         |   |      |           | Multiplier   |            |   |        | Multiplier     |            |      |
|         | C   | HL^T | (1-E) HRV | 16.80        |            | C   | HG^T   | 13.82          |            |      |
|         | 1.08  | 77.8 | 0.20      |              |            | 1.08  | 12.8   |                |            |      |
| Case 3  |   |      |           |              |            | Case 3  |        |                |            |      |
| Case 3  | Ventilation Heat Loss (Forced Air Systems)    |      |           |              |            | Ventilation Heat Gain (Forced Air Systems)    |        |                |            |      |
|         |   |      | HLbvent   | Multiplier   |            |   |        | Vent Heat Gain | Multiplier |      |
|         | Total Ventilation Load                        |      | 1336      | 0.04         |            | HGbvent                                       | HG*1.3 | 1099           | 0.07       |      |
|         |   |      |           |              |            | 1099  | 1      |                |            |      |

|  |         |      |       |      |       |
|--|---------|------|-------|------|-------|
| Foundation Conductive Heatloss Level 1           | Level 1 | 2347 | Watts | 8008 | Btu/h |
| Foundation Conductive Heatloss Level 2           | Level 2 |      | Watts |      | Btu/h |
| Slab on Grade Foundation Conductive Heatloss     |         |      | Watts |      | Btu/h |
| Walk Out Basement Foundation Conductive Heatloss |         | 157  | Watts | 536  | Btu/h |



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ENERGY STAR® for New Homes  
Version Ontario 17.1 Revision 2  
BOP Form Zone 1 Ontario



| General Details                    |                                   | House Details          |                                  |
|------------------------------------|-----------------------------------|------------------------|----------------------------------|
| Performance or Prescriptive :      | <b>Prescriptive</b>               | ESEnrolment ID:        |                                  |
| Attached or Detached or MURB :     | <b>Detached</b>                   | Site/Phase:            | <b>KING EAST PH 2&amp;3</b>      |
| Province / Territory :             | <b>ON</b>                         | LOT :                  |                                  |
| Zone :                             | <b>Zone 1 Heating Degree Days</b> | Street # and Name:     |                                  |
| Service Organization (SO) number : | <b>55 - Enerquality</b>           | Street Type:           |                                  |
| Builder number :                   | <b>TBD</b>                        | City :                 | <b>RICHMOND HILL</b>             |
| Builder Name:                      | <b>PLAZACORP</b>                  | Postal Code (or FSA) : |                                  |
|                                    |                                   | Model:                 | <b>ALL MODELS</b>                |
| Supplementary Information          |                                   | Third Party Evaluator: | <b>BUILDING KNOWLEDGE CANADA</b> |
|                                    |                                   | Evaluator Name:        | <b>ANGELA BUSTAMANTE</b>         |
|                                    |                                   | Evaluator Number:      | <b>5506</b>                      |

| Building Component                                     | Core / Option | BOP Selection Description  | BOP Option Credits | Measure Selected (Check) | Nominal Efficiency Values (Optional) | Notes (Optional) |
|--|---------------|--|--------------------|--------------------------|--------------------------------------|------------------|
|  |               |  |                    | ✓                        |                                      |                  |
| Ceilings Below Attic                                   | Core          | RSI 10.43 (R 59.2)   | Core Minimum       | ✓                        | R60                                  |                  |
|  | Option        | N/A  | n/a                |                          |                                      |                  |
| Cathedral Ceilings and Flat Roofs                      | Core          | RSI 4.87 (R 27.7)  | Core Minimum       | ✓                        | R31                                  |                  |
|  | Option        | N/A  | n/a                |                          |                                      |                  |
| Ceilings Below Attic and Cathedral Ceilings/Flat Roofs | Option        | N/A  | n/a                |                          |                                      |                  |
| Walls Above Grade                                      | Core          | RSI 3.08 (R 17.5)  | Core Minimum       |                          |                                      |                  |
|  | Option        | RSI 3.72 (R 21.1)  | 0.7                | ✓                        | R22+R5                               |                  |
| Floors Over Unheated Spaces                            | Core          | RSI 5.25 (29.8)  | Core Minimum       | ✓                        | R31                                  |                  |
| Foundation Walls Below or in Contact with the Ground   | Core          | RSI 3.72 (R 21.1) below grade  | Core Minimum       | ✓                        | R20 blanket                          |                  |
|  | Option        | N/A  | n/a                |                          |                                      |                  |
| Unheated Floors on Ground Above Frost Line             | Core          | RSI 1.96 (R 11.1)  | Core Minimum       | ✓                        | R10 if applicable                    |                  |
| Unheated Floors on Ground Below Frost Line             | Option        | N/A  | n/a                |                          |                                      |                  |
| Heated Floors on Ground                                | Core          | N/A  | n/a                |                          |                                      |                  |
| Slabs on Grade with Integral Footing                   | Core          | N/A  | n/a                |                          |                                      |                  |
| Windows (Fenestrations)                                | Core          | ENERGY STAR Zone 2 UV1.4 and/or ER29   | Core Minimum       | ✓                        | Zone 2                               |                  |
|  | Option        | N/A  | n/a                |                          |                                      |                  |
|  | Core          | Total area of all windows to max. 20% of above grade wall area.              | Core Minimum       | ✓                        |                                      |                  |
| Fireplace  | Core          | Gas fireplace spark ignition if installed                                    | #N/A               | ✓                        |                                      |                  |
| Space Heating  | Core          | Min. 96% AFUE ENERGY STAR fuel fired furnace                                 | Core Minimum       | ✓                        |                                      |                  |
|  | Req'd         | Supply ducts and 1m return sealed  | Required           | ✓                        |                                      |                  |
| Domestic Water Heating                                 | Core          | Instantaneous min. EF or UEF 0.80 Tank EF or UEF 0.80 (direct vent (sealed)) | Core Minimum       |                          |                                      |                  |
|  | Option        | Instantaneous condensing min. UEF 0.95                                       | 0.4                | ✓                        |                                      |                  |
| Drain Water Heat Recovery                              | Option        | ≥ 42% to ≤ 54% - two showers   | 0.3                | ✓                        | 42%                                  |                  |
| Airtightness   | Core          | Level 1 (DT 2.5ach / 0.18 nlr) (AT 3.0ach/0.26nlr)                           | Core Minimum       | ✓                        |                                      |                  |
|  | Option        | N/A  | n/a                |                          |                                      |                  |
| Ventilation (HRV / ERV)                                | Core          | 65% SRE @0 °C and 55% SRE @ -25 °C   | Core Minimum       |                          |                                      |                  |
|  | Option        | ≥75% SRE @ 0 °C  | 0.2                | ✓                        |                                      |                  |
|  | Req'd         | Interconnected to the Furnace Fan  | Required           | ✓                        |                                      |                  |
|  | Req'd         | HRV balanced   | Required           | ✓                        |                                      |                  |
| Electrical Savings                                     | Electrical    | SRE ≥75% SRE @ 0 °C, ≥ 0.57 L/s/W  | 0.1                | ✓                        |                                      |                  |
|  | Core          | 75% ENERGY STAR lighting   | Core Minimum       |                          |                                      |                  |
|  | Option        | 100% ENERGY STAR lighting  | 0.1                | ✓                        |                                      |                  |
| ENERGY STAR Certified Appliances                       | Option        | N/A  | n/a                |                          |                                      |                  |

NOTE: Thermal resistance values under "BOP Selection Description" are listed in effective values, unless indicated with "nominal".

Total BOP Option Credits (Must be ≥ 1.8 Credits)

1.8

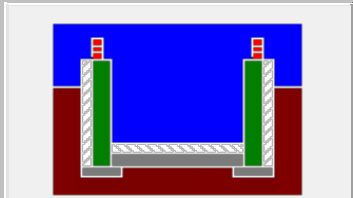
# Envelope Air Leakage Calculator

Supplemental tool for CAN/CSA-F280

| Weather Station Description       |                                       |       |                |    |
|-----------------------------------|---------------------------------------|-------|----------------|----|
| Province:                         | Ontario ▼                             |       |                |    |
| Region:                           | Richmond Hill ▼                       |       |                |    |
| Weather Station Location:         | Open flat terrain, grass ▼            |       |                |    |
| Anemometer height (m):            | 10                                    |       |                |    |
| Local Shielding                   |                                       |       |                |    |
| Building Site:                    | Suburban, forest ▼                    |       |                |    |
| Walls:                            | Heavy ▼                               |       |                |    |
| Flue:                             | Heavy ▼                               |       |                |    |
| Highest Ceiling Height (m):       | 8.53                                  |       |                |    |
| Building Configuration            |                                       |       |                |    |
| Type:                             | Detached                              |       |                |    |
| Number of Stories:                | Two                                   |       |                |    |
| Foundation:                       | Shallow                               |       |                |    |
| House Volume (m <sup>3</sup> ):   | 1139.46                               |       |                |    |
| Air Leakage/Ventilation           |                                       |       |                |    |
| Air Tightness Type:               | Present (1961-) (ACH=3.57)            |       |                |    |
| Custom BDT Data:                  | ELA @ 10 Pa. ▼ 322.44 cm <sup>2</sup> |       |                |    |
|                                   | 3.57 ACH @ 50 Pa                      |       |                |    |
| Mechanical Ventilation (L/s):     | Total Supply:                         |       | Total Exhaust: |    |
|                                   | 39.75                                 |       | 39.75          |    |
|                                   |                                       |       |                |    |
| Flue #:                           | #1                                    | #2    | #3             | #4 |
| Diameter (mm):                    | 0                                     | 0     | 0              | 0  |
|                                   |                                       |       |                |    |
| Heating Air Leakage Rate (ACH/H): |                                       | 0.387 |                |    |
| Cooling Air Leakage Rate (ACH/H): |                                       | 0.108 |                |    |

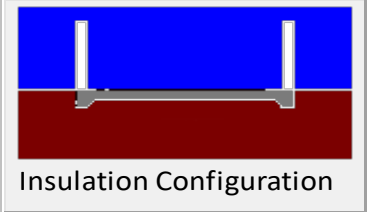
# Residential Foundation Thermal Load Calculator

Supplemental tool for CAN/CSA-F280

| Weather Station Description    |                                 |  |
|--------------------------------|---------------------------------|--|
| Province:                      | Ontario ▼                       |  |
| Region:                        | Richmond Hill ▼                 |  |
| Site Description               |                                 |  |
| Soil Conductivity:             | High conductivity: moist soil ▼ |  |
| Water Table:                   | Normal (7-10 m, 23-33 Ft) ▼     |  |
| Foundation Dimensions          |                                 |  |
| Floor Length (m):              | 21.26                           |  <p>Insulation Configuration</p> |
| Floor Width (m):               | 5.56                            |  |
| Exposed Perimeter (m):         | 44.50                           |  |
| Wall Height (m):               | 2.74                            |  |
| Depth Below Grade (m):         | 0.91                            |  |
| Window Area (m <sup>2</sup> ): | 1.39                            |  |
| Door Area (m <sup>2</sup> ):   | 1.95                            |  |
| Radiant Slab                   |                                 |  |
| Heated Fraction of the Slab:   | 0                               |  |
| Fluid Temperature (°C):        | 33                              |  |
| Design Months                  |                                 |  |
| Heating Month                  | 1                               |  |
| Foundation Loads               |                                 |  |
| Heating Load (Watts):          |                                 | 2347   |

# Residential Slab on Grade Thermal Load Calculator

Supplemental tool for CAN/CSA-F280

| Weather Station Description  |                               |  |
|------------------------------|-------------------------------|--|
| Province:                    | Ontario                       | ▼  |
| Region:                      | Richmond Hill                 | ▼  |
| Site Description             |                               |  |
| Soil Conductivity:           | High conductivity: moist soil | ▼  |
| Water Table:                 | Normal (7-10 m, 23-33 Ft)     | ▼  |
| Floor Dimensions             |                               |  |
| Length (m):                  | 9.29                          | <br>Insulation Configuration |
| Width (m):                   | 0.62                          |  |
| Exposed Perimeter (m):       | 10.67                         |  |
| Radiant Slab                 |                               |  |
| Heated Fraction of the Slab: | 0                             |  |
| Fluid Temperature (°C):      | 33                            |  |
| Design Months                |                               |  |
| Heating Month                | 1                             |  |
| Foundation Loads             |                               |  |
| Heating Load (Watts):        |                               | 157  |



2985 Drew Road, Suite 202 Mississauga, Ontario L4T 0A4

Tel: 905-671-9800 email: [hvac@gtadesigns.ca](mailto:hvac@gtadesigns.ca)

### Effective R-Value Calculations

| Effective R-Value - Above Grade Walls |         |
|---------------------------------------|---------|
| Insulation                            | R22+5ci |
| Exterior Air Film                     | 0.17    |
| Hollow Vinyl Siding                   | 0.62    |
| Continuous Insulation                 | 5.00    |
| Effective Cavity Insulation           | 14.49   |
| Drywall                               | 0.44    |
| Interior Air Film                     | 0.68    |
|                                       |         |
| Effective R-Value                     | 21.40   |

| Effective R-Value - Below Grade Walls |       |
|---------------------------------------|-------|
| Insulation                            | R20ci |
| Concrete Foundation                   | 0.44  |
| Interior Air Film                     | 0.68  |
| Continuous Insulation                 | 20.0  |
|                                       |       |
| Effective R-Value                     | 21.12 |

| Effective R-Value – Exposed Floors |       |
|------------------------------------|-------|
| Insulation                         | R31   |
| Exterior Air Film                  | 0.17  |
| Effective Cavity Insulation        | 28.72 |
| Interior Air Film                  | 0.91  |
| Continuous Insulation              | 0.00  |
| Effective R-Value                  | 29.80 |



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

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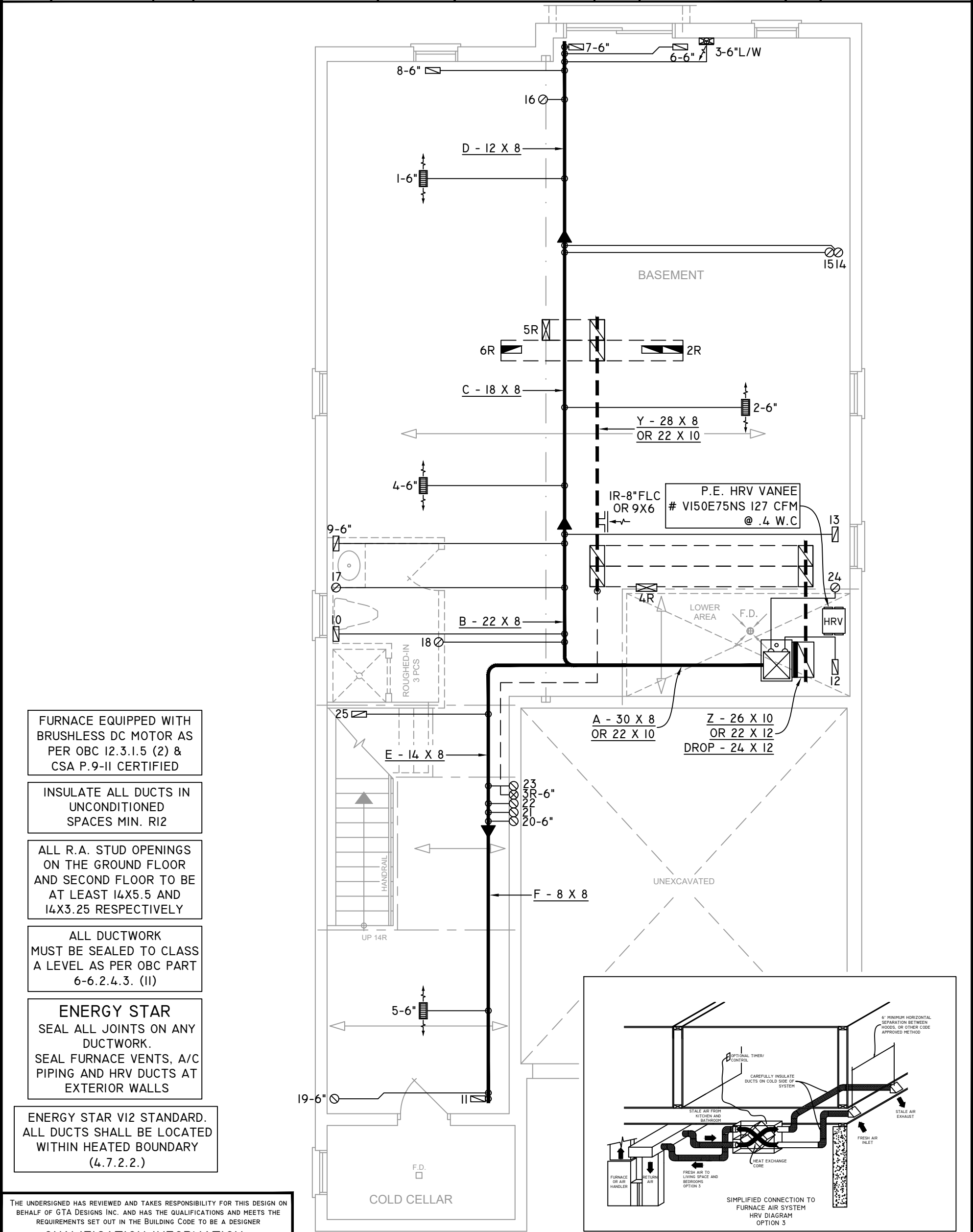
Effective R-Value – Exposed Ceiling with Attic

|                      |       |
|----------------------|-------|
| Insulation           | R60   |
| Exterior Air Film    | 0.17  |
| Effective Insulation | 58.61 |
| Drywall              | 0.44  |
|                      |       |
| Effective R-Value    | 59.22 |

Effective R-Value – Exposed Ceiling with Flat Roofs

|                      |       |
|----------------------|-------|
| Insulation           | R31   |
| Exterior Air Film    | 0.17  |
| Effective Insulation | 27.04 |
| Drywall              | 0.44  |
|                      |       |
| Effective R-Value    | 27.65 |

|  |                  |   |                                    |   |                                 |   |   |   |                              |
|--|------------------|---|------------------------------------|---|---------------------------------|---|---|---|------------------------------|
|    | FLEX DUCT        |    | LOW/HIGH WALL/KICK SUPPLY DIFFUSER |    | DUCT CONNECTION TO JOIST LINING |    | RETURN AIR GRILLE (SIZE INDICATED ON DRAWING) | S.A.  | SUPPLY AIR                   |
|   | RIGID ROUND DUCT |   | HRV EXHAUST GRILLE                 |   | RETURN AIR PIPE RISER           |   | RETURN AIR RISER UP TO FLOOR ABOVE            | R.A.  | RETURN AIR                   |
|  | SUPPLY DIFFUSER  |  | SUPPLY AIR PIPE RISER              |  | RETURN ROUND DUCT               |  | RETURN AIR FROM BASEMENT SECOND FLOOR         |   | THERMOSTAT                   |
|  |                  |  | VOLUME DAMPER                      |   |                                 |   |   |  | PRINCIPAL EXHAUST FAN SWITCH |
|  |                  |   |                                    |   |                                 |   |   |  | W/R & PRINCIPAL EXHAUST FAN  |



FURNACE EQUIPPED WITH BRUSHLESS DC MOTOR AS PER OBC 12.3.1.5 (2) & CSA P.9-II CERTIFIED

INSULATE ALL DUCTS IN UNCONDITIONED SPACES MIN. R12

ALL R.A. STUD OPENINGS ON THE GROUND FLOOR AND SECOND FLOOR TO BE AT LEAST 14X5.5 AND 14X3.25 RESPECTIVELY

ALL DUCTWORK MUST BE SEALED TO CLASS A LEVEL AS PER OBC PART 6-6.2.4.3. (II)

ENERGY STAR SEAL ALL JOINTS ON ANY DUCTWORK. SEAL FURNACE VENTS, A/C PIPING AND HRV DUCTS AT EXTERIOR WALLS

ENERGY STAR VI2 STANDARD. ALL DUCTS SHALL BE LOCATED WITHIN HEATED BOUNDARY (4.7.2.2.)

THE UNDERSIGNED HAS REVIEWED AND TAKES RESPONSIBILITY FOR THIS DESIGN ON BEHALF OF GTA DESIGNS INC. AND HAS THE QUALIFICATIONS AND MEETS THE REQUIREMENTS SET OUT IN THE BUILDING CODE TO BE A DESIGNER

QUALIFICATION INFORMATION

REQUIRED UNLESS DESIGN IS EXEMPT UNDER DIVISION C 3.2.5.1 OF THE ONTARIO BUILDING CODE

DAVID DA COSTA  B.C.I.N. 32964

SIGNATURE OF DESIGNER

BASEMENT FLOOR PLAN

OBC 2012

ZONE I COMPLIANCE  
PACKAGE "ENERGY STAR" REF. TABLE 3.1.3.

NOTES

INSTALLATION TO COMPLY WITH THE LATEST ONTARIO BUILDING CODE.

ALL SUPPLY OUTLETS TO BE 5" DIA. UNLESS OTHERWISE SPECIFIED.

PROVIDE BALANCING DAMPERS ON ALL BRANCHES.

ALL R/A PARTITIONS 6" (FIRST FLOOR ONLY)

INSULATE DUCTS IN UNCONDITIONED SPACES R12 UNDERCUT ALL DOORS 1" MIN.

CONTRACTOR MUST WORK FROM APPROVED PLANS.

ANY ALTERATIONS TO THIS ORIGINAL PLAN ARE NOT THE RESPONSIBILITY OF GTA DESIGNS.

GTA DESIGNS MUST BE CONSULTED IF KITCHEN EXHAUST FAN EXCEEDS 700 CFM DEPRESSURIZATION MAY OCCUR WITH IN THE DWELLING.



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










|                      |                  |           |
|----------------------|------------------|-----------|
| HEAT-LOSS            | 59,353           | BTU/HR.   |
| UNIT MAKE            | CARRIER          | OR EQUAL. |
| UNIT MODEL           | 59SC5B080E17--16 | OR EQUAL. |
| UNIT HEATING INPUT   | 80,000           | BTU/HR.   |
| UNIT HEATING OUTPUT  | 78,000           | BTU/HR.   |
| A/C COOLING CAPACITY | 3.0              | TONS.     |
| FAN SPEED            | 1185             | CFM       |

| # OF RUNS | S/A | R/A | FANS |
|-----------|-----|-----|------|
| 3RD FLOOR |     |     |      |
| 2ND FLOOR | 11  | 3   | 3    |
| 1ST FLOOR | 9   | 2   | 2    |
| BASEMENT  | 5   | 1   |      |

|                      |                |
|----------------------|----------------|
| FLOOR PLAN: BASEMENT |                |
| DRAWN BY: JL         | CHECKED: DD    |
| LAYOUT NO. JB-09092  | DRAWING NO. MI |
| 3237                 |                |

|          |   |
|----------|---|
| DATE:    | JULY 31, 2023                             |
| CLIENT:  | EM AIR SYSTEMS                            |
| MODEL:   | MODEL 3250 WOB                            |
| PROJECT: | KING EAST DEVELOPMENTS RICHMOND HILL,ONT. |
| SCALE:   | 3/16" = 1'-0"                             |



|  |                  |   |                                    |   |                                 |   |   |   |                              |
|--|------------------|---|------------------------------------|---|---------------------------------|---|---|---|------------------------------|
|    | FLEX DUCT        |    | LOW/HIGH WALL/KICK SUPPLY DIFFUSER |    | DUCT CONNECTION TO JOIST LINING |    | RETURN AIR GRILLE (SIZE INDICATED ON DRAWING) | S.A.  | SUPPLY AIR                   |
|   | RIGID ROUND DUCT |   | HRV EXHAUST GRILLE                 |   | RETURN AIR PIPE RISER           |   | RETURN AIR RISER UP TO FLOOR ABOVE            | R.A.  | RETURN AIR                   |
|  | SUPPLY DIFFUSER  |  | SUPPLY AIR PIPE RISER              |  | RETURN ROUND DUCT               |  | RETURN AIR FROM BASEMENT SECOND FLOOR         |   | THERMOSTAT                   |
|  |                  |  | VOLUME DAMPER                      |   |                                 |   |   |  | PRINCIPAL EXHAUST FAN SWITCH |
|  |                  |   |                                    |   |                                 |   |   |  | W/R & PRINCIPAL EXHAUST FAN  |

KITCHEN EXHAUST  
100 CFM MIN. 6"  
ALL OTHER FANS SHALL BE  
A MIN. OF 50 CFM OR  
OTHERWISE NOTED  
AS PER 9.32.3.5

CIRCULATION PRINCIPAL  
FAN SWITCH  
TO BE CENTRALLY  
LOCATED

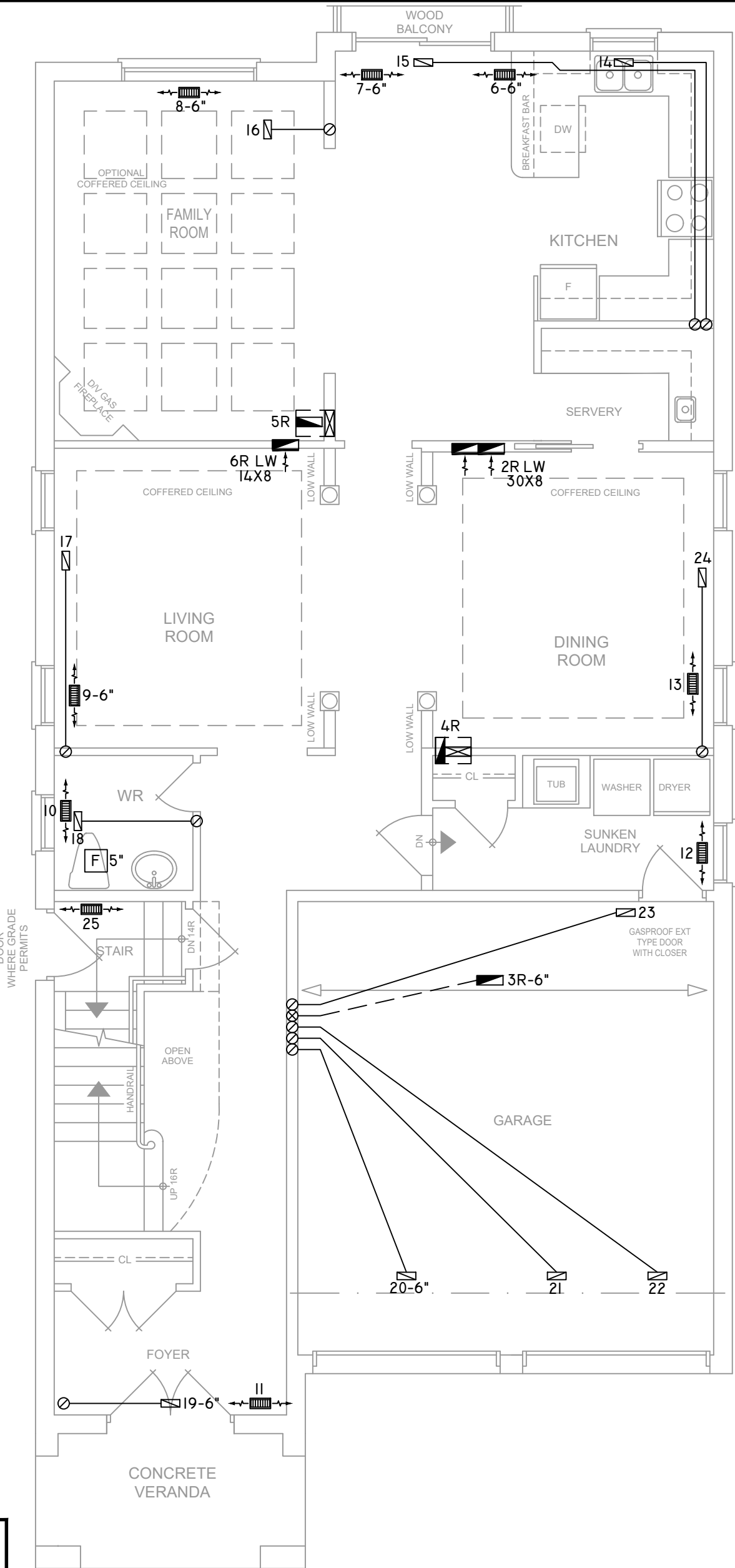
INSULATE ALL DUCTS IN  
UNCONDITIONED  
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AT LEAST 14X5.5 AND  
14X3.25 RESPECTIVELY

ALL DUCTWORK  
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A LEVEL AS PER OBC PART  
6-6.2.4.3. (II)

ENERGY STAR  
SEAL ALL JOINTS ON ANY  
DUCTWORK.  
SEAL FURNACE VENTS, A/C  
PIPING AND HRV DUCTS AT  
EXTERIOR WALLS

ENERGY STAR V12 STANDARD.  
ALL DUCTS SHALL BE LOCATED  
WITHIN HEATED BOUNDARY  
(4.7.2.2.)



FIRST FLOOR PLAN

OBC 2012

ZONE I COMPLIANCE  
PACKAGE "ENERGY STAR" REF. TABLE 3.1.3.

THE UNDERSIGNED HAS REVIEWED AND TAKES RESPONSIBILITY FOR THIS DESIGN ON BEHALF OF GTA DESIGNS INC. AND HAS THE QUALIFICATIONS AND MEETS THE REQUIREMENTS SET OUT IN THE BUILDING CODE TO BE A DESIGNER

**QUALIFICATION INFORMATION**

REQUIRED UNLESS DESIGN IS EXEMPT UNDER DIVISION C 3.2.5.1 OF THE ONTARIO BUILDING CODE

DAVID DA COSTA  B.C.I.N. 32964  
SIGNATURE OF DESIGNER

**NOTES**

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PROVIDE BALANCING DAMPERS ON ALL BRANCHES.

ALL R/A PARTITIONS 6" (FIRST FLOOR ONLY)

INSULATE DUCTS IN UNCONDITIONED SPACES R12 UNDERCUT ALL DOORS 1" MIN.

CONTRACTOR MUST WORK FROM APPROVED PLANS.

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**GTADESIGNS**



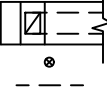













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EMAIL: DAVE@GTADESIGNS.CA  
WEB: WWW.GTADESIGNS.CA

|                      |                  |           |
|----------------------|------------------|-----------|
| HEAT-LOSS            | 59,353           | BTU/HR.   |
| UNIT MAKE            | CARRIER          | OR EQUAL. |
| UNIT MODEL           | 59SC5B080E17--16 | OR EQUAL. |
| UNIT HEATING INPUT   | 80,000           | BTU/HR.   |
| UNIT HEATING OUTPUT  | 78,000           | BTU/HR.   |
| A/C COOLING CAPACITY | 3.0              | TONS.     |
| FAN SPEED            | 1185             | CFM       |

| # OF RUNS | S/A | R/A | FANS |
|-----------|-----|-----|------|
| 3RD FLOOR |     |     |      |
| 2ND FLOOR | 11  | 3   | 3    |
| 1ST FLOOR | 9   | 2   | 2    |
| BASEMENT  | 5   | 1   |      |

|             |             |              |
|-------------|-------------|--------------|
| FLOOR PLAN: |             | GROUND FLOOR |
| DRAWN BY:   | CHECKED:    | SQFT         |
| JL          | DD          | 3237         |
| LAYOUT NO.  | DRAWING NO. |              |
| JB-09092    | M2          |              |

|          |  |
|----------|--|
| DATE:    | JULY 31, 2023                              |
| CLIENT:  | EM AIR SYSTEMS                             |
| MODEL:   | MODEL 3250 WOB                             |
| PROJECT: | KING EAST DEVELOPMENTS RICHMOND HILL, ONT. |
| SCALE:   | 3/16" = 1'-0"                              |

|  |                  |   |                                    |   |                                 |   |  |   |  |
|--|------------------|---|------------------------------------|---|---------------------------------|---|--|---|--|
|    | FLEX DUCT        |    | LOW/HIGH WALL/KICK SUPPLY DIFFUSER |   | DUCT CONNECTION TO JOIST LINING |    | RETURN AIR GRILLE<br>(SIZE INDICATED ON DRAWING) | S.A.  | SUPPLY AIR   |
|  | RIGID ROUND DUCT |  | HRV EXHAUST GRILLE                 |  | RETURN AIR PIPE RISER           |  | RETURN AIR RISER UP TO FLOOR ABOVE               | R.A.  | RETURN AIR   |
|  | SUPPLY DIFFUSER  |  | SUPPLY AIR PIPE RISER              |  | RETURN ROUND DUCT               |  | RETURN AIR FROM BASEMENT SECOND FLOOR            |  | THERMOSTAT   |
|  |                  |  | VOLUME DAMPER                      |   |                                 |  |  |  | PRINCIPAL EXHAUST FAN SWITCH W/R & PRINCIPAL EXHAUST FAN |

INSULATE ALL DUCTS IN UNCONDITIONED SPACES MIN. R12

ALL R.A. STUD OPENINGS ON THE GROUND FLOOR AND SECOND FLOOR TO BE AT LEAST 14X5.5 AND 14X3.25 RESPECTIVELY

ALL DUCTWORK MUST BE SEALED TO CLASS A LEVEL AS PER OBC PART 6-6.2.4.3. (II)

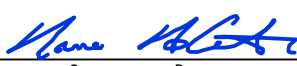
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ENERGY STAR VI2 STANDARD.  
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QUALIFICATION INFORMATION

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DAVID DA COSTA  B.C.I.N. 32964

SIGNATURE OF DESIGNER

TUB

F 5"

16

ENSUITE

SH

WALK-IN CLOSET

5R HW 14X8

BEDROOM 4

17

BATH 2

18

F 5"

DN 16R

HANDRAIL

OPEN BELOW

36" HIGH RAILING

MEDIA CENTER

CATHEDRAL CEILING

19-6"

METAL ROOF

15

14

MASTER BEDROOM

24

4R HW 14X8

LINEN

BATH

23

F 5"

3R LW 14X8

BEDROOM 3

20-6"

21

22

METAL ROOF


OBC 2012

SECOND FLOOR PLAN

ZONE I COMPLIANCE

PACKAGE "ENERGY STAR" REF. TABLE 3.1.3.

**NOTES**  
INSTALLATION TO COMPLY WITH THE LATEST ONTARIO BUILDING CODE.  
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PROVIDE BALANCING DAMPERS ON ALL BRANCHES.  
ALL R/A PARTITIONS 6" (FIRST FLOOR ONLY)  
INSULATE DUCTS IN UNCONDITIONED SPACES R12 UNDERCUT ALL DOORS 1" MIN.  
CONTRACTOR MUST WORK FROM APPROVED PLANS.  
ANY ALTERATIONS TO THIS ORIGINAL PLAN ARE NOT THE RESPONSIBILITY OF GTA DESIGNS.  
GTA DESIGNS MUST BE CONSULTED IF KITCHEN EXHAUST FAN EXCEEDS 700 CFM DEPRESSURIZATION MAY OCCUR WITH IN THE DWELLING.





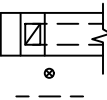













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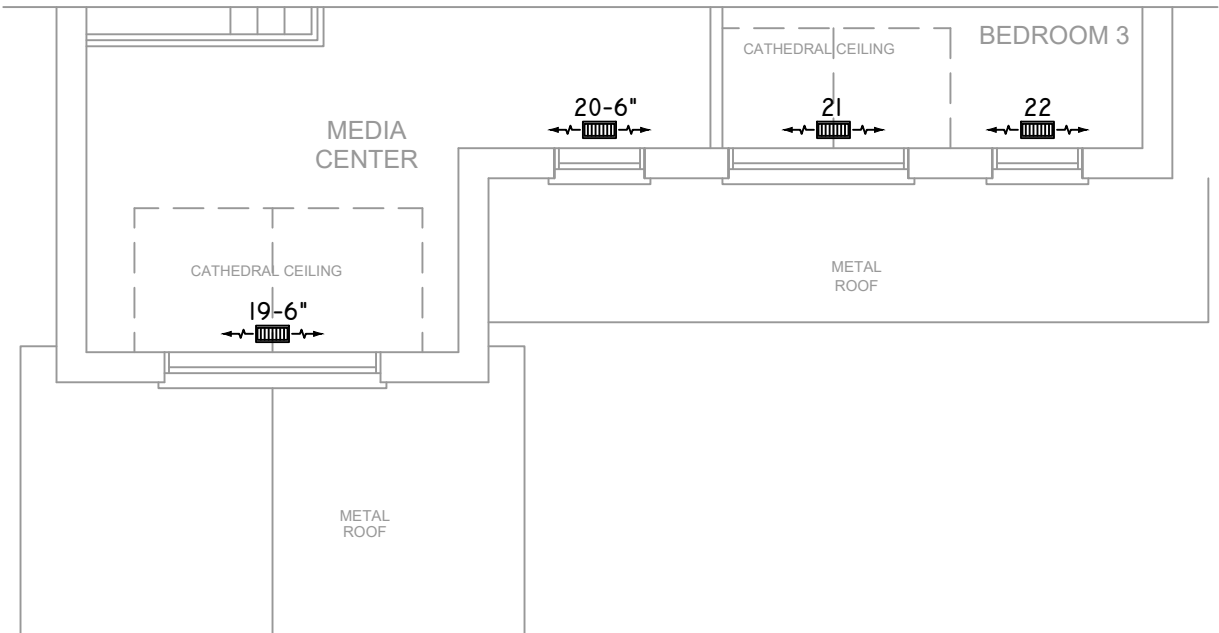
|                      |                  |           |
|----------------------|------------------|-----------|
| HEAT-LOSS            | 59,353           | BTU/HR.   |
| UNIT MAKE            | CARRIER          | OR EQUAL. |
| UNIT MODEL           | 59SC5B080E17--16 | OR EQUAL. |
| UNIT HEATING INPUT   | 80,000           | BTU/HR.   |
| UNIT HEATING OUTPUT  | 78,000           | BTU/HR.   |
| A/C COOLING CAPACITY | 3.0              | TONS.     |
| FAN SPEED            | 1185             | CFM       |

| # OF RUNS | S/A | R/A | FANS |
|-----------|-----|-----|------|
| 3RD FLOOR |     |     |      |
| 2ND FLOOR | 11  | 3   | 3    |
| 1ST FLOOR | 9   | 2   | 2    |
| BASEMENT  | 5   | 1   |      |

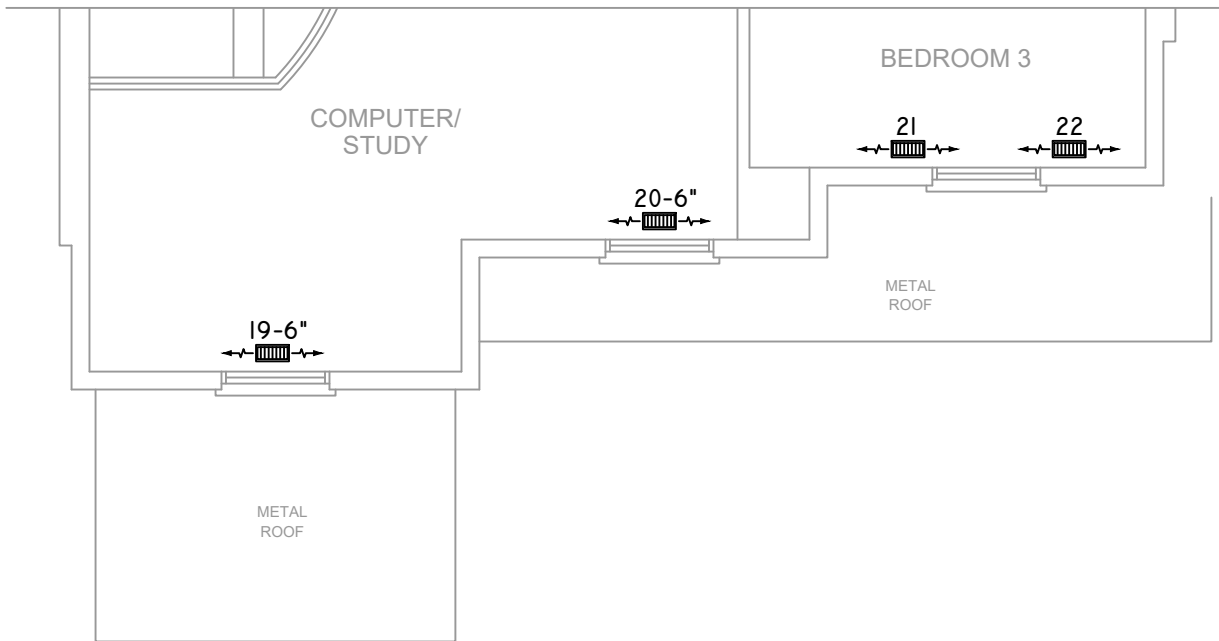
| FLOOR PLAN: SECOND FLOOR |                |           |
|--------------------------|----------------|-----------|
| DRAWN BY: JL             | CHECKED: DD    | SQFT 3237 |
| LAYOUT NO. JB-09092      | DRAWING NO. M3 |           |

|          |  |
|----------|--|
| DATE:    | JULY 31, 2023                                |
| CLIENT:  | EM AIR SYSTEMS                               |
| MODEL:   | MODEL 3250 WOB                               |
| PROJECT: | KING EAST DEVELOPMENTS<br>RICHMOND HILL,ONT. |
| SCALE:   | 3/16" = 1'-0"                                |

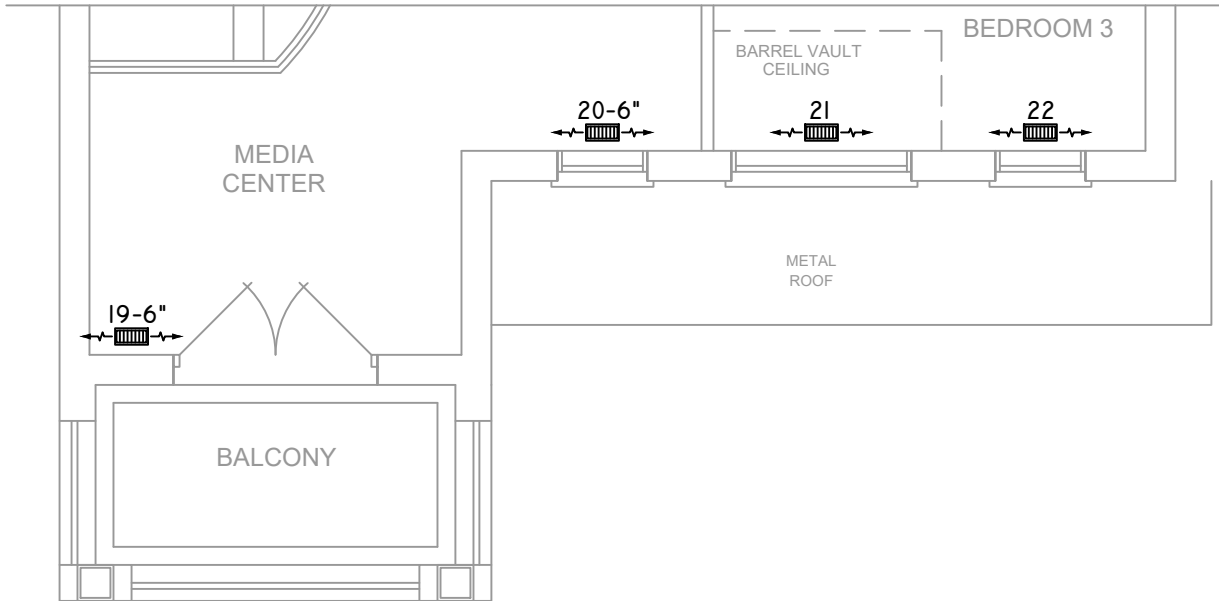
|  |                  |   |                                    |   |                                 |   |   |   |  |
|--|------------------|---|------------------------------------|---|---------------------------------|---|---|---|--|
|    | FLEX DUCT        |    | LOW/HIGH WALL/KICK SUPPLY DIFFUSER |   | DUCT CONNECTION TO JOIST LINING |    | RETURN AIR GRILLE (SIZE INDICATED ON DRAWING) | S.A.  | SUPPLY AIR   |
|   | RIGID ROUND DUCT |   | HRV EXHAUST GRILLE                 |  | RETURN AIR PIPE RISER           |   | RETURN AIR RISER UP TO FLOOR ABOVE            | R.A.  | RETURN AIR   |
|  | SUPPLY DIFFUSER  |  | SUPPLY AIR PIPE RISER              |  | RETURN ROUND DUCT               |  | RETURN AIR FROM BASEMENT SECOND FLOOR         |   | THERMOSTAT   |
|  |                  |  | VOLUME DAMPER                      |   |                                 |  |   |  | PRINCIPAL EXHAUST FAN SWITCH W/R & PRINCIPAL EXHAUST FAN |



SECOND FLOOR PLAN 'D'



SECOND FLOOR PLAN 'C'




SECOND FLOOR PLAN 'B'

THE UNDERSIGNED HAS REVIEWED AND TAKES RESPONSIBILITY FOR THIS DESIGN ON BEHALF OF GTA DESIGNS INC. AND HAS THE QUALIFICATIONS AND MEETS THE REQUIREMENTS SET OUT IN THE BUILDING CODE TO BE A DESIGNER

**QUALIFICATION INFORMATION**

REQUIRED UNLESS DESIGN IS EXEMPT UNDER DIVISION C 3.2.5.1 OF THE ONTARIO BUILDING CODE

DAVID DA COSTA



B.C.I.N. 32964

SIGNATURE OF DESIGNER

OBC 2012

ZONE I COMPLIANCE  
PACKAGE "ENERGY STAR" REF. TABLE 3.1.3.

**NOTES**  
INSTALLATION TO COMPLY WITH THE LATEST ONTARIO BUILDING CODE.  
ALL SUPPLY OUTLETS TO BE 5" DIA. UNLESS OTHERWISE SPECIFIED.  
PROVIDE BALANCING DAMPERS ON ALL BRANCHES.  
ALL R/A PARTITIONS 6" (FIRST FLOOR ONLY)  
INSULATE DUCTS IN UNCONDITIONED SPACES R12 UNDERCUT ALL DOORS 1" MIN.  
CONTRACTOR MUST WORK FROM APPROVED PLANS.  
ANY ALTERATIONS TO THIS ORIGINAL PLAN ARE NOT THE RESPONSIBILITY OF GTA DESIGNS.  
GTA DESIGNS MUST BE CONSULTED IF KITCHEN EXHAUST FAN EXCEEDS 700 CFM DEPRESSURIZATION MAY OCCUR WITH IN THE DWELLING.



2985 DREW ROAD  
SUITE 202,  
MISSISSAUGA, ONT.  
L4T 0A4 TEL: 905-671-9800  
EMAIL: DAVE@GTADESIGNS.CA  
WEB: WWW.GTADESIGNS.CA

|                      |                  |           |
|----------------------|------------------|-----------|
| HEAT-LOSS            | 59,353           | BTU/HR.   |
| UNIT MAKE            | CARRIER          | OR EQUAL. |
| UNIT MODEL           | 59SC5B080E17--16 | OR EQUAL. |
| UNIT HEATING INPUT   | 80,000           | BTU/HR.   |
| UNIT HEATING OUTPUT  | 78,000           | BTU/HR.   |
| A/C COOLING CAPACITY | 3.0              | TONS.     |
| FAN SPEED            | 1185             | CFM       |

| # OF RUNS | S/A | R/A | FANS |
|-----------|-----|-----|------|
| 3RD FLOOR |     |     |      |
| 2ND FLOOR | 11  | 3   | 3    |
| 1ST FLOOR | 9   | 2   | 2    |
| BASEMENT  | 5   | 1   |      |

| FLOOR PLAN:         |                |           |
|---------------------|----------------|-----------|
| PARTIAL PLAN(S)     |                |           |
| DRAWN BY: JL        | CHECKED: DD    | SQFT 3237 |
| LAYOUT NO. JB-09092 | DRAWING NO. M4 |           |

|          |   |
|----------|---|
| DATE:    | JULY 31, 2023                             |
| CLIENT:  | EM AIR SYSTEMS                            |
| MODEL:   | MODEL 3250 WOB                            |
| PROJECT: | KING EAST DEVELOPMENTS RICHMOND HILL,ONT. |
| SCALE:   | 3/16" = 1'-0"                             |