# Certificate of Design and Manufacturing Conformance

with NBC 2005

This Certificate is to affirm that all components of the steel building system described below, to be supplied by the named Manufacturer certified in accordance with CSA A660, have been or will be designed and fabricated in accordance with the following Standards to carry the loads and load combinations specified.

## 1. DESCRIPTION

| | |
|---|---|
| Manufacturer's Name and Address: | **Braemar Building Systems** |
| Manufacturer's Certificate Number under CSA A660: | **BRAEM0** |
| Customer Order Number: | **B8-602** |
| Building Type and Size (in feet): | Width: **24** Length: **40** Height: **14** Type: **RF** |
| Intended Use and Occupancy: | **Industrial** |
| Importance Category (NBC, Clause 4.1.2.1.(3)): | **Normal** |
| Site Location: | **Yellowknife** **Northwest Territories** |
| Applicable Building Code: | **National Building Code of Canada, 2005** |
| Builder's Name and Address: | **Department of Indian and Northern Affairs**<br>**Yellowknife, Northwest Territories** |
| Owner's Name and Address: | **Department of Indian and Northern Affairs**<br>**Yellowknife, Northwest Territories** |

Initials

## 2. DESIGN STANDARDS

National Building Code of Canada, 2005, Part 4: Structural Design:
CAN/CSA-S16-01, Limit States Design of Steel Structures:
CAN/CSA-S136-01, North American Specification for the Design of Cold-Formed Steel Structural Members:
Other (specify): **n/a** Dated: **n/a**

## 3. MANUFACTURING STANDARDS:

**(a)** Fabrication has been or will be in accordance with CAN/CSA-S16 and CAN/CSA-S136, as applicable:
**(b)** Welding has been or will be performed in accordance with CAN/CSA W59 and CAN/CSA-S136, as applicable:
**(c)** The Manufacturer has been certified in accordance with CSA W47.1, for Division 1 or Division 2, and/or CSA W55.3, if applicable:
**(d)** Welders have been qualified in accordance with CSA W47.1:

## 4. PURLIN STABILITY:

Purlin braces are provided in accordance with CAN/CSA-S136, Clause D3 and Appendix B, Clause D3.2.3. In particular, for a standing seam roof supported on movable clips, braces providing lateral support to both top and bottom purlin flange have been or will be provided. The number of rows is determined by analysis but in no case is less than 1 for spans up to 7 metres inclusive or less than 2 for spans greater than 7 metres.

## 5. LOADS:

**(a) Snow, Ice, and Rain Load:**

| | | | | |
|---|---|---|---|---|
| 1-in-50 year ground snow load, Ss, | **2.20** | (kPa) | | |
| 1-in-50 year associated rain load, Sr, | **0.10** | (kPa) | | |
| Basic roof snow load factor, Cb, | **0.80** | | | |
| Wind exposure factor, Cw, | **1.00** | | | |
| Importance factor, Is, | **1.00** | ULS | **0.9** | SLS |
| Roof snow load, S, (assuming Ca=1 and Cs=1) | **1.86** | (kPa) | | |

Drift loads considered (NBC, Clause 4.1.6.2.8) refer to drawing of specific building
1-in-50 year one day rain (NBC, Clause 4.1.6.4) **60** (mm)

**(b) Full and Partial Snow Load:**

(i) Applied on any one and any two adjacent spans of continuous purlins
(ii) Applied on any one and any two adjacent spans of modular rigid frames with continuous roof beams
(iii) Applied as described for the building geometry in NBC, Division B Part 4, Section 4.1.6, and in the User's Guide - NBC 2005 Structural Commentaries (Part 4 of Division B), Commentary G: Snow Loads

**(c) Wind Load**

| | | | | |
|---|---|---|---|---|
| 1-in-50 year reference velocity pressure | **0.47** | (kPa) | | |
| Importance factor, Iw, | **1.00** | ULS | **0.75** | SLS |

**(d) Wind Load Application**

(i) Applied as per NBC, Division B Part 4, Section 4.1.7
(ii) Pressure coefficients as per User's Guide - NBC 2005 Structural Commentaries (Part 4 of Division B), Commentary I: Wind Loads, figures I3 through I12
(iii) Building internal pressure category **2** per User's Guide - NBC 2005 Structural Commentaries (Part 4), Commentary I: Wind Loads and Effects

**(e) Crane Loads** — **n/a**

Capacity : **n/a** (tons),or **n/a** (tonnes)
Type : **n/a**
Wheel Base : **n/a** (m)

| | | | |
|---|---|---|---|
| Vertical impact factor : | **n/a** | Maximum static, vertical wheel load: | **n/a** (kN) |
| Lateral factor : | **n/a** | lateral wheel load: | **n/a** (kN) |
| Longitudinal factor : | **n/a** | Maximum longitudinal load: | **n/a** (kN/side) |

**(f) Mezzanine Live Load:** **n/a** (kPa) — **n/a**

**(g) Seismic Load:**

Applied as per NBC, Division B Part 4, Subsection 4.1.8

| | | | | |
|---|---|---|---|---|
| Sa(0.2): | **0.12** | Site Class: | **E** | |
| Sa(0.5): | **0.056** | Fa: | **2.1** | Fv: **2.1** |
| Sa(1.0): | **0.023** | I E: | **1.00** | |
| Sa(2.0): | **0.006** | Interstorey Drift: | **H/ 40** | |

**(h) Other Live Loads (specify)** — **n/a**

**n/a**

**(i) Dead Loads**

Dead load of building components shown on Braemar drawings is incorporated in the design.
Collateral load (mechanical, electrical, ceiling, sprinklers, etc.) : **0.00** (kPa)
Mezzanine : **n/a** (kPa)
Other (specify) : **n/a**

**(j) Load Combinations**

Applied in accordance with NBC, Division B Part 4, Section 4.1.3.2

## 6. GENERAL REVIEW DURING CONSTRUCTION

The manufacturer does not provide general review during construction for regulatory purposes.

## 7. CERTIFICATION BY ENGINEER

I hereby certify that I am a Professional Engineer registered or licensed to practice in **Northwest Territories** and that I have reviewed the design and manufacturing process for the steel building system described. I certify that the foregoing statements, initialed by me, are true.

Name

**Professional Engineer**
Title

**Northwest Territories**
Applicable Province or Territory

**NAPEGG**
Affiliation

| Professional Seal: | Company Seal (if applicable): |
|---|---|
| | |

## GENERAL

This drawing including information hereon, remains the property of Braemar Building Systems Inc. (BBS). It is provided solely for erecting the building described in the purchase order and shall not be modified, reproduced, or used for any other purpose without prior written approval of BBS.

The general contractor and/or erector is solely responsible for accurate, good quality workmanship in erecting this building in conformance with this drawing, details referenced in this drawing and industry standards pertaining to proper erection including proper use of temporary bracing. Braemar Building Systems Inc. is not responsible for errors, omissions or damages incurred in the erection of the components shown on this drawing, nor the inspection of erected components to determine same.

This certification and engineering seal applies only to products designed and supplied by Braemar Building Systems Inc. for the loading conditions designated on these drawings. Concrete foundations, steel components by others and erection supervision are not the responsibility of Braemar Building Systems Inc. or the certifying engineer.

## ANCHOR BOLTS

Anchor bolt diameters are determined in accordance with CSA standard CAN S16–01 using A307 anchors. Anchor bolt length and load transfer to the foundation are to be determined by others.

Foundation must be level, square and smooth. Anchor bolts must be accurately placed as shown on the drawings.

All dimensions shown are to the building girt line unless noted otherwise.

Finished floor elevations and underside of base plate is 100'–0" unless noted.

## ERECTION

The erector must provide safe working conditions and practices conforming to all safety regulations. All lifting devices are to be specifically designed to lift the various building components. Slings and spreader bars are to be used to prevent permanent deformation of all structural components.

Erection should start at a braced bay. Erect and temporarily support frames. Use temporary bracing as required to ensure stability of the frames. Install purlins and girts and permanent roof and wall bracing. Plumb columns and square frames in accordance with CAN/CSA S16–01. Install flange braces to purlins and girts prior to installing cladding.

Install roof and wall cladding, fasteners and sealants as specified in the erection drawings.

Do not use panels for walking platforms. Temporary loads on roof panels should be directly over purlins.

Ensure girts and purlins remain parallel.

Structural framing members are considered plumb, level and aligned when the variance does not exceed 1:300.

## STRUCTURAL BOLTS

Bolts in connections not subject to tension loads, or where loosening due to vibration or load fluctuations are not design considerations need only be snug tightened, which is defined as the tightness that exists when all plies in a joint are in firm contact.

Bolts in connections subject to tension loads require pretensioning to minimum tension values shown in Table A. The only method of pretensioning is turn–of–nut tightening as specified in CAN/CSA S16–01. In turn–of–nut tightening, all bolts shall be brought to a "snug tight" condition ensuring that all plies are in firm contact with each other. "Snug tight" condition is attained by a few impacts of an impact wrench or the full effort of a person using a spud wrench. When all bolts are "snug tight", each bolt shall then be tightened additionally by the applicable nut rotation given in Table B. Tightening should progress systematically from the most rigid part of the connection to the free edges. During the operation, there shall be no rotation of the part not turned by the wrench. Nut rotation is relative to bolt regardless of whether the nut or bolt is being turned. Tolerance on rotation is 30° over or under.

## STRUCTURAL BOLTS (Continued)

TABLE A

| Size | | A325 | | A490 | |
|---|---|---|---|---|---|
| in | mm | kips | kN | kips | kN |
| 0.750 | 19 | 28 | 125 | 35 | 157 |
| 0.875 | 22 | 39 | 174 | 49 | 218 |
| 1.000 | 25 | 51 | 227 | 64 | 285 |
| 1.125 | 29 | 56 | 249 | 80 | 356 |
| 1.250 | 32 | 71 | 316 | 102 | 454 |

TABLE B

| Bolt Length (Measured from the underside of the head to the extreme end of the point) | Turn |
|---|---|
| up to and including 4 diameters | 1/3 |
| over 4 diameters and not exceeding 8 diameters or 8 inches (200mm) | 1/2 |
| exceeding 8 diameters or 8 inches | 2/3 |

Bolts tightened by turn–of–nut method should have the outer face of the nut match marked with the protruding bolt point before final tightening. Marking permits visual inspection that actual nut rotation has been achieved. Such marks can be made using a crayon or dab of paint after bolts have been brought up snug tight.

Inspection of the sides of bolts or nuts snug tightened using an impact wrench will appear slightly peened as a result of the tightening process. No further inspection in necessary for bolts in bearing type connections as performance is independent of initial pre–tensioning.

Torque is not a reliable means to pretension bolts. In cases of dispute as to installed bolt tension an arbitration method is provided in CAN/CSA S16–01. This provides a means to calibrate a torque wrench with a direct tension indicator.

## MATERIAL SPECIFICATIONS

Rolled structural sections:
CAN/CSA G40.20–04/G40.21–04 GRADE 50W and/or ASTM A992/A992M–04 GRADE 50.

HSS sections:
CAN/CSA G40.20–04/G40.21–04 GRADE 50W Class C and/or ASTM A500–03 GRADE 50.

Structural plate:
CAN/CSA G40.20–04/G40.21–04 GRADE 50W and/or ASTM A992/A992M–04 GRADE 50.

Girts and Purlins: ASTM A1011.

Bolts: All bolts larger than 1/2" diameter conform to ASTM A325.
All 1/2" diameter bolts conform to SAE Gr. 5 or equivalent.

Diagonal Bracing: Diagonal brace rod steel minimum yield stress is 36 ksi (248 MPa).
Diagonal brace steel cable is extra high strength per ASTM A475.

Shop Primer: Shop primer is intended to withstand exposure to an essentially non–corrosive atmosphere for a short period and conforms to CISC/CPMA Standard 1–73a. Shop primer is not intended to be a long–term finish or to provide long–term protection.

## ROOF PLAN NOTES

Unless noted, use 1/2" diameter bolts for purlin lap, purlin to frame, flange brace to frame, and flange brace to purlin connections.

Wind, flange and purlin bracing are an integral part of the roof structural system and should be properly installed prior to erection of wall and roof sheets. Removal or alteration of roof or wall bracing without prior authorization is prohibited.

## CLADDING / LINER NOTES

Wall sheets are an integral part of the structural system. Removal or alteration without prior authorization is prohibited.

## ELEVATION NOTES

Field slot girts (maximum slot 1 3/4" wide x 4" long) at center of web to allow diagonal bracing to pass through if required.

Holes required in girts or eave struts for framed openings, door or window jamb connections to be by erector.

Walk door, window and framed opening jambs to be field anchored to concrete with 1/2" diameter "Hilti Kwik–Bolts" or similar.

## ELEVATION NOTES (Continued)

Base angle or channel to be fastened with Ramset or similar at 24" centers.

Wind and flange bracing are an integral part of the roof structural system and should be properly installed prior to erection of wall and roof sheets. Removal or alteration of roof or wall bracing without prior authorization is prohibited.

Use 1/2" diameter bolts for purlin to frame, girt to frame and girt to clip connections unless noted otherwise.

## PARTITION WALL NOTES

Field installation of partition wall to underside of any roof framing members must allow for vertical building deflection. Contact Braemar Building Systems Inc. for required clearances.

## MATERIAL STORAGE

Galvanized, aluminized, and colored materials are subject to corrosion and discoloration if they are improperly stored. Short term job site storage of roof and wall covering may be tolerated, provided care is taken to keep these materials dry at all times. When panels are to be stored outdoors, they should be placed at an angle that is sufficient to provide good drainage. In addition, several inches of clearance must be provided between the lower end and the ground to allow ventilation. Long panels should be blocked in the center to to prevent center sag resulting in water accumilation.

Braemar Building Systems Inc. will not be held responsible for materials which are improperly protected after delivery.

## MEMBER SECTION DESIGNATION

Built–up sections can be used in lieu of standard mill sections on any project. Both light gauge components and built–up components have a standard designation that is used by Braemar Building Systems Inc. The following tables describe the designation of each component:

| BUILT–UP MEMBER – WAABCD | EXAMPLE – W14563 | |
|---|---|---|
| AA – REFERS TO OVERALL DEPTH (IN)<br>B – REFERS TO FLANGE WIDTH (IN)<br>C – REFERS TO FLANGE THICKNESS IN 16TH (IN)<br>D – REFERS TO WEB THICKNESS IN 16TH (IN) | 14" deep member (overall depth)<br>5" wide flanges<br>6/16" or 3/8" flange thickness<br>3/16" web thickness | |
| LIGHT GAUGE COMPONENTS XxBBYAA (–DBL) | 8x25Z16 | 10x30C14 |
| X – refers to component depth in inches<br>Y – refers to component shape<br>AA – refers to component thickness (gauge)<br>BB – refers to top and bottom nominal flange width<br>DBL – refers to double member required (two sections are nested in the field) | 8" deep<br>ZEE shape<br>16 gauge<br>2.5" flange width | 10" deep<br>CEE shape<br>14 gauge<br>3.0" flange width |

## FIELD WELDING

All field welding must be done by a company certified to CSA W47.1.

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| 0 △ | ISSUED FOR APPROVAL 02/13/08 |

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| | | |
|---|---|---|
| CUSTOMER: | INDIAN AND NORTHERN AFFAIRS | |
| PROJECT: | INDIAN AND NORTHERN AFFAIRS | |
| LOCATION: | YELLOWKNIFE, NT | |
| DRAWN BY: | DATE: 2/ 5/08 | JOB#: B8–602 |
| CHECKED BY: | DATE: | SHEET: G1 OF 1 |