Bureau of Standards Jamaica

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BUILDING SYSTEMS EVALUATION REPORT
BSYS No.: 27/2020/1477

Customer Name & Address:	Axsumite Homes Limited 6 Kings Avenue, Kingston 10 St.Andrew	**Reference**:	Documents submitted
		Date Received:	Feb 24, 2020
Manufacturer:	Eco Building System Corp.	**Date Reported**:	Jan 29, 2020
Product:	ICCF Building System (The Perfect Block)	**Job No./ID No.**:	27/2020/1477
Specification:	National Building Code / ICC	**Test Method**:	Research on Literature Provided
Ambient Conditions:	Not Applicable	**Test Uncertainty**:	Not applicable

1.0 USES OF BUILDING SYSTEM:

1.1. The Perfect Block Building System is designed and manufactured for used in light weight and eco-friendly construction. The intended use in Jamaica will be in construction of residential and commercial structures. It is aimed at providing an alternative, cost-effective insulated composite form (ICCF) building plan for future project to the regular building construction.

1.2. Outside of Jamaica, the ICCF Building System and components have been used in similar applications for the construction of internal and external walls.

BUREAU OF STANDARDS JAMAICA
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1.3. The Perfect blocks may be freely integrated in Type V construction and also Type I, II, III and IV construction is conditional based on building code requirements for fire-resistance.

1.4. The intent of the system is to provide improved lightweight materials that will withstand high seismic and wind loads and yet remain safe enough to reduce risk to occupants in the event of any of these natural disasters

1.5. The insulation performance is maintained throughout by way of continuously insulated walls, preventing any thermal bridging.

2.0 SCOPE OF EVALUATION

2.1. Global compliance with the Jamaica National Building Code series[1] , especially the JS 306: Jamaica Application Document for the IBC and JS 315: Jamaica Application Document for the International Residential Code (IRC). The nature of the perfect block building system and its application requires that, consideration be given to the general compliance with other Jamaican Code Application Documents listed in Table 1 below:

Table 1: Jamaican Application Documents and their use in the evaluation

Building Configuration or Performance Criteria	Applicable Code Document
Buildings > 300m² (3,000 ft²)	The Jamaica Building Code (JBC) which is comprised of the 2003 version of the International Building Code (IBC) plus JS 306: Jamaica Application Document for the IBC
Conventional (regularly shaped and without any complex structure or services) buildings ≤ 300 m² (3,000 ft²)	The Jamaica Residential Code (JRC) which is comprised of the 2003 version of the International Residential Code (IRC) plus JS 315: Jamaica Application Document for the IRC,
Unconventional (irregularly shaped with or without any complex structure or services) buildings ≤ 300m² (3,000 ft²)	The Jamaica Building Code (JBC) which is comprised of the 2003 version of the International Building Code (IBC) plus JS 306: Jamaica Application Document for the IBC
Compliance with energy conservation requirements	The Jamaica Energy Conservation Code (JECC) which is comprised of the 2003 version of the International Energy

[1] The Jamaica National Building Code comprises twelve International Codes and eleven corresponding Application Documents specific to different areas in the building construction industry.

Building Configuration or Performance Criteria	Applicable Code Document
	Conservation Code (IECC) plus JS 309: Jamaica Application Document for the IECC, was used.
Compliance with mechanical systems installation requirements,	The Jamaica Mechanical Code (JMC) which is comprised of the 2003 version of the International Mechanical Code (IMC) plus JS 312: Jamaica Application Document for the IMC.
Compliance of plumbing installations requirements	The Jamaica Plumbing Code (JPC) which is comprised of the 2003 version of the International Plumbing Code (IPC) plus JS 307: Jamaica Application Document for the IPC.
Compliance with fire safety requirements	The Jamaica Fire Code (JFC) which is comprised of the 2003 version of the International Fire Code (IFC) plus JS 314: Jamaica Application Document for the IFC.
Compliance of electrical installations requirements	The Jamaica Electrical Code (JEC) which is comprised of the 2003 version of the International Code Council Electrical Code (ICCEC) , the 2002 version of the National Electrical Code (NEC) and JS 316: Jamaica Application Document for the ICCEC/NEC.

2.2. Recommendations of requirements to be met during the use of the Perfect Block Building System in the design and construction phases of the building are also provided in this report. In particular, the evaluation considered recommendations for acceptance and use of the system in Jamaica. Recommendations consider requirements in planning, buildings types and sizes, foundations, wall construction, fire safety, general safety, structural limitations/adequacy, energy conservation, structural and electrical, mechanical, plumbing and other relevant requirements of the Residential/Small Building Code of Jamaica.

3.0 OTHER ASPECTS EVALUATED

a) Description and function of the system
b) Compliance (of materials & system) in jurisdiction of origin
c) Material properties
d) Quality Control

4.0 APPROACH TO THE EVALUATION (JAMAICA)

4.1. The Jamaica National Building Code comprises twelve (12) International Codes and eleven (11) corresponding Application Documents specific to different areas in the building construction industry. In the evaluation, the Application Documents which contains applicable local requirements are used as lead documents. They provide guidance on all requirements to be met including those of the corresponding International Code. Consideration is also given to the fact that a revised Jamaican Application Documents will be based in ICC 2009 codes.

4.2. The Perfect Block Building System has met a number of code requirements within the United States of America or the ACI Standard requirements jurisdiction where a similar code to the Jamaican Code is used. Section R611 of the IRC limits the concrete core of The Perfect Block Building System to a minimum thickness of 150 mm (6 inches) light weight wall panel System. Furthermore, the wind speeds of 111.76 m/s (250 M.P.H.) in the IRC would also not allow for its use in the design, construction and occupancy under the IRC. These requirements therefore preclude the sole use of the prescriptive approach of the IRC.

4.3. This evaluation therefore seeks to ensure compliance with the specific local Application Document and draws on evidence provided that the corresponding International Code requirements have been met. In this regard, the relevant performance requirements IBC 2009, IRC 2009, Acceptance Criteria for Foam Plastic Insulation, ICC- AC 15: Acceptance Criteria for Concrete Floor, Roof, and Wall Systems and Concrete Masonry Wall Systems (2010), were used as guides for establishing critical compliance requirements. The Perfect Block have passed all of the testing outlined below per the requirements of the current versions of ASTM E1886 / E1996, ASTM E330, ICC-500 sections 304.2(1), 806.2, 305.1.1, design wind speed of 250 mph,

5.0 DOCUMENTS SUBMITTED

Table 2 below provides a list of the main documents submitted by Axsumite Homes Limited to the Bureau of Standards to support its application for approval.

ITEM #	ITEM DESCRIPTION	COMMENTS
1	Completed Application for Review of the Building System	Provided information in nearly all categories requested
2	Technical Manual	Comprehensive guide covering description and details on: compliance, limitations, design concepts, bracing requirements, wall bracing capacity and analysis, wall, exterior water proofing, construction guidelines, construction process, maintenance standards and drawings.
3	The Perfect Block Sample unit	Physical Sample taken into lab for

ITEM #	ITEM DESCRIPTION	COMMENTS
		inspection
4	Demonstration of Completed unit drawing	Link to drawing provided in Google Drive
5	Demonstration of configuration and calculation	Link to calculation provided in Google Drive
6	Demonstration of different configuration of units and finishes for various applications	Link to documents provided in Google Drive. Shows different thicknesses and adjustments to accommodate concrete and steel in pockets
7	Demonstration of Fire Endurance Test	Test Report Google Drive

6.0 BRIEF DESCRIPTION OF THE SYSTEM & COMPONENTS

6.1. General

6.1.1. The Perfect Block building system is a light weight non-loadbearing masonry unit with energy saving, with cement and Expandable Polystyrene Styrofoam (EPS) beads. This product is intended to replace construction materials such as red brick, clay soil brick, air brick color-coated steel sandwich board and gypsum block and also hollow concrete block. It can be widely applied to various low and high rise buildings such as banks, office, schools, hospitals, shopping malls, hotel, portable dwellings, old house reconstruction, family house and workshop.

6.1.2. An approved thermal barrier is required to separate the ICCF wall from the interior of the building. Gypsum wallboard of not less than ½-inch (12.7 mm) is an approved thermal barrier. Other coverings that can be used are Portland cement plaster or other various proprietary materials that are tested in accordance with and meet the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA.

6.1.3. The Perfect Block building system is classified as a light-weight fireproof, energy saving panel and environmentally friendly material system in accordance with section R611 of the IRC and ICC-AC 15. A screen-grid ICF Wall System is a perforated concrete wall. The detail requirements of IRC 2009, section R611.3.3 and IRC 2006 Section 611.5 are applicable.

6.1.4. This classification means that The Perfect Block building is not a solid concrete wall and its fire rating is determined by the extent and quality of cladding materials.

6.2. Dimensions

The Perfect Block is available in standard thicknesses of 6, 8, 10, and 12 inches (152, 203, 254, and 305 mm) and standard height 12 inches (305mm). Standard length is 48" (1219 mm).

6.3 Material Properties

The Perfect Block Insulated Composite Concrete Form (ICCF) Wall System is hollow core forms of a Light weight mixture of 100% recycled expanded polystyrene (EPS) ground into an aggregate, Portland cement, proprietary admixtures and water. 85% - 87% of the volume of each block is EPS and has a density between 20 and 24 pcf (320 and 380 kg/m3).

6.4 Samples and Materials Submitted

Axsumite Homes Limited submitted a sample of the system to the Bureau of Standards; pictures of the panels were also made available.

7.0 EVALUATION OF DOCUMENTS

The documentation provided by Axsumite Homes Limited (see Table 2) was quite comprehensive and covers the following broad areas:

a) Application Documentation with summary information on building system.
b) Technical Manual with information covering compliance, limitations, design concepts, bracing requirements, wall bracing capacity etc.
c) Test reports.
d) Training and Installation.

8.0 General Comments.

The scope, structure and content of the Technical Manual and information submitted by the Axsumite Homes Limited on the perfect block

8.1.1. Reflect an understanding of the critical importance of performance criteria being met, in order, to allow for approval and use of the system. The information on the proposed product, compliance route, use and maintenance were logically presented and gives reasonable confidence that the client has taken the necessary steps to ensure compliance in the United States.

8.1.2. The summary documentation for application to the Bureau has sufficient basis to be accepted by the Bureau.

8.2. Technical Specification Manual

8.2.1. This document was provided in hard and electronic copy and reflects a clear understanding of the design and installation procedures required to meet code requirements in the use of the perfect Block in USA. The information in the manual

parallels the design and installation processes and will assist with compliance of the system to state intent. Information provided in details is as follows:

a) Product Information
   - Introduction
   - Compliance with building code
   - Limitation and consideration

b) Design Concepts
c) Construction guidelines
d) Construction process
e) Maintenance
f) Drawings

8.2.2. The assumption that the perfect block Building System will be used by professionals in the design of buildings is in keeping with the requirements of the Jamaican Application Document for the IBC. In Jamaica, the designer of the building of residential units must consult with the JS 315: Jamaica Application Document to the International Residential Code.

8.2.3. While the instruction and information provided were generally adequate for America, there are some differences in the code requirements as it relates to Jamaica. The American Code is more general and performance based while the Jamaican Code is more prescriptive. It is therefore important that the manufacturer and local supplier pay attention to the recommendations in this report and ensure that they are met at all stages from design to installation and commissioning of buildings in which the system is used.

8.2.4. Where a performance based requirement is met it shall exceed that of the equivalent prescriptive requirement.

8.3. Test Reports

8.3.1. Axsumite Homes Limited submits test reports for elements of the building system from ECO Building System CORP.

8.3.2. All technical claims and specifications with respect to appearance quality , size deviation, impact resistance-times, flexural load- multiples of panel weight, planar density (g/cm^3), percentage of moisture (%), dry shrinkage (mm/m), hanging load (N), air sound insulation value (dB), thermal conductivity coefficient $\{W/(m^2 \cdot K)\}$ and sound transmission loss were supported by test results.

8.4. Certificates

8.4.1. The documentation provided by Axsumite Homes Limited included :

a) Testing compliance letter
b) Hurricane ASTM E1886 ASTM E1996 H6867.02

c) TORNADO ASTM E330, ASTM E1886, E1196, ICC-500 E1996

d) EBS Products ICC Equivalent Compliance Criteria With Test Results 2019

e) 4 Hour Fire Test E119 4,500 design load Passed

f) Engineering calculations

g) Engineer Assessment of EBS The Perfect Block 2018

8. DESIGN & INSTALLATION SPECIFIC COMPLIANCE REQUIREMENTS

8.1 Design:

8.1.1 JAD/IBC Design: Concrete walls constructed from perfect block shall conform to the applicable sections of JS306: Jamaica Application Document for the International Building Code (JAD/IBC) chapters 16 and 19. Foundations to support the use of perfect block must comply with R404 and or IBS 1805 as applicable. In lieu of testing the engineering analysis must comply with the requirements of chapter 19 of IBC 2009 of later versions.

8.1.2 JAD/IRC Conventional Design: Concrete walls constructed from perfect block shall conform to sections R404.1 and R611 except for reinforcement in shear walls, wall corners and intersections of load bearing and non-load-bearing walls, ring beams, stiffener columns, tie beams, columns and beams which are required to conform to section R606.15, R606.16, R606.17, R606.18, R606.19, R606.20, R606.21 and R606.22, of the Application Document. The perfect block is not designed to be used in the construction of footings and foundations, hence R404.4 does not apply.

8.1.3 JAD/IRC Non-conventional Design: Concrete walls constructed from perfect block shall conform to R611 except for reinforcement that shall be designed to conform to applicable sections of chapter 16 of JS306. Foundations to support the perfect block must comply with R404 and/or IBS 1805 as applicable.

8.1.4 JAD/ECC Design: Walls constructed from perfect block shall conform generally to JS 309: Jamaica Application Document for the International Energy Conservation Code (JAD/ECC), but specifically to sections 3A02, 402, 502, 602 and 8.4 as well as JS 315: Jamaica Application Document to the International Residential Code (JAD/IRC) chapter 11;

8.1.5 JAD/MC Design: Concrete walls constructed from perfect block conform generally to JS 312: Jamaica Application Document to the International Mechanical Code (JAD/IMC) and JS 315: Jamaica Application Document to the International Residential Code (JAD/IRC) chapters 12 to 23 inclusive.

8.1.6 JAD/IPC Design: Concrete walls constructed from perfect block shall conform generally to JS 307: Jamaica Application Document for the International Plumbing Code (JAD/IPC) and JS 315: Jamaica Application Document to the International Residential Code (JAD/IRC) chapters 25 to 32 inclusive.

8.1.7 JAD/IFC Design: Concrete walls constructed from perfect block shall conform generally to JS 314: Jamaica Application Document to the International Fire Code (JAD/IFC) but particularly to chapters 7, 8, 9 and 10.

8.1.8 JAD/IEC Design: Walls constructed from perfect block shall conform generally to JS 316: Jamaica Application Document for the International Code Council Electrical Administrative Provisions and National Electrical Code (JAD/ICCEC/NEC) and the JS 315: Jamaica Application Document to the International Residential Code (JAD/IRC) chapters 33 to 42 inclusive but specifically to the JAD/ICCEC/NEC document sections 312, 314, 322, 340,342, 344, 352, 358, 404, 406 and 408.

8.2 Installation:

8.2.1 The perfect block installation
The following conditions shall be observed in the installation of the perfect block building system:

a) The perfect block must be installed in accordance with published information in the Technical Manual, the perfect block website, this report and the applicable codes. Where there are conflicts in the published information this report and the requirements of the respective Jamaican Code shall apply.

b) The published installation instructions and this report must be strictly adhered to, and a copy of these instructions must be available at all times at the job site during installation.

c) The perfect block must be supported on concrete foundation footings complying with chapter 18 of JS306: JAD/IBC or chapter 4 of the JS 315: JAD/JRC.

d) Vertical reinforcing bars embedded in the footing, must extend at least 600 mm (24 inches) into the wall.

e) The perfect block must be stacked in a running bond pattern such that the core pockets align vertically.

f) Vertical and horizontal reinforcement shall be calculated when the JS306: JAD/IBC is applicable and as prescribed by the JS 315: JAD/IRC when applicable.

g) When concrete is placed on the wall system, anchor bolts to provide the support for solid corbels which serve as ledges for loads such as brick veneers and floor loads, shall be suitably embedded into the concrete-filled core.

h) The spacing and embedment depth of anchor bolts used for ledges shall comply with the structural and code requirements (JAD/IBC is applicable and as prescribed by the JS 315: JAD/IRC).

i) Anchor bolts used to connect wood plates or ledgers to the belt or ring/bond beam shall be cast-in-place with the bolt sized and spaced as required by the design using values as indicated by sections 1912 or 1913 of the JS306: JAD/IBC. **The use of bent-over projections from vertical steel reinforcement is not acceptable.**

8.2.2 Interior Finish

The perfect block exposed to the interior of the building maybe covered with one of the following approved finishes:

a) Gypsum board complying with ASTM C 1396 and having a minimum thickness of 12 mm (½ inch). These gypsum boards shall be attached to the panels by No.6 Type W coarse thread, gypsum wall screws having sufficient length to ensure penetration of 75 mm (3 inches) which are directly or indirectly anchored to the concrete cores. Gypsum boards shall be installed vertically with screws spaced 400 mm (16 inches) on centers horizontally and 300 mm (12 inches) on centers vertically. Gypsum wall board joints shall be taped and filled with joint compound in accordance with GA-216 or ASTM C 840.

b) Adhered masonry veneer. This shall have a maximum weight of 98 kg/m² (20 psf) and shall be installed in accordance with Section 1405.9 of the JS306: JAD/IBC. Where the interior veneer is supported by wood construction, the supporting members shall be designed to limit deflection to span/600 of the supporting members.

c) Anchored masonry veneer. This could take the form of corrosion-resistant wire mesh and woven wire plaster base anchored to the panels' concrete walls/columns using 75 mm (3 inch) long No. 8d corrosion-resistant steel wire furring screws anchored at a maximum spacing of 200 mm (8 inches) on center both horizontally and vertically. Screws shall penetrate the concrete columns by a minimum of 28

mm (1.125 inch). Concrete plaster complying with JS 306: JAD/IBC chapter 25 shall be a minimum thickness of 25 mm (1 inch).

Summary

An approved thermal barrier is required to separate the ICCF wall from the interior of the building. Gypsum wallboard of not less than ½-inch (12.7 mm) is an approved thermal barrier. Other coverings that can be used are Portland cement plaster or other various proprietary materials that are tested in accordance with and meet the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

8.2.3 Exterior Finish

a) The perfect block may be covered on the exterior with an approved wall covering in accordance with the applicable code. Under the JS 306: JAD/IBC, exterior wall finishes shall comply with chapter 14; while under the JS 315: JAD/IRC, the walls must be flashed in accordance with Section R703.8 of that code. The approved wall covering shall be attached to the walls/columns with fasteners. Fasteners must be corrosion-resistant and have sufficient length to penetrate concrete core by a minimum of 12 mm (1/2 inch). Fasteners shall have acceptable withdrawal and lateral capacities. The maximum fastener spacing shall be designed to support the gravity load of the wall covering and resist the negative wind pressures. Negative wind pressure capacity of the exterior finish material shall be the same as that recognized in the code for generic materials.

b) Adhered masonry veneer shall comply with the applicable requirements of Section 1405.9.1 of JS 306: JAD/IBC and Sections 6.1 and 6.3 of ACI 530/ASCE 5/TMS 402. Adhesion developed between adhered veneer units and backing shall have a shear strength of at least 0.34 MPa (50 psi) based on gross unit surface area or shall be adhered in compliance with Article 3.3C of ACI 530.1/ASCE 6/TMS 602.

Summary

Above Grade: Exterior walls must be finished with a weather-resistant exterior wall envelope that complies with Section 1403 of the IBC. Wall coverings must be attached to the concrete core within the form using fasteners designed to support the weight of the wall covering and to resist applicable wind loads, to the satisfaction of the code official. Negative wind pressure capacity of the exterior finish material must be the same as that recognized in the code for generic materials or that recognized in a current report for proprietary materials.

Below Grade: Wall surfaces must be damp-proofed and when required by the local building department, waterproofed in accordance to the jurisdiction and applicable codes. Waterproofing materials must be approved by Eco Building Systems Corp. and the code official.

8.2.4 Concrete

a) Concrete to be used with the perfect block shall meet the following requirements:

i. The quality, mixing and placing shall comply with applicable local and international standards.

ii. Shall have normal weight, maximum aggregate size of 19 mm (¾ inch) and maximum slump of 152 mm (6 inches).

iii. The maximum water to cement ratio shall be 0.5, unless otherwise approved by the code official.

iv. Shall be sampled at the time of placing and 3, 7 and 28 day compressive strength test determined in the appropriate manner. The minimum compressive strength at 28 days shall be 20.7 MPa (3,000 psi).

v. Under JS 306: JAD/IBC, concrete shall comply with chapter 19 generally and section 1904.2.2 specifically while under JS 315: JAD/IRC, concrete shall comply with sections R404.4 and R611. 5.1.

vi. The minimum ambient temperature during placement must be in accordance with ACI 306.

8.2.5 Reinforcement

The reinforcing deformed steel bars used with the perfect block must have a minimum yield stress of 275 MPa (40,000 psi). The deformed steel bars shall comply with JS 33. In addition, if construction is based on the JS 315: JAD/IRC, reinforcement shall comply with section R404.4.6 and R611.6.2

8.2.6 Energy Conservation

JS 309: JAD/IECC requires that external walls have an R-value of at least 11 for buildings done under the JS 306 or JS 315. The perfect blocks are expected to have an R-value of at least 50 creating low utility bills.

8.2.7 Mechanical Systems

i. The designer, installer and user of the perfect block shall ensure compliance with the JAD/IMC, for example with respect to:

a. Supporting wall mounted air-conditioning units and fans.
b. Requirements for emitted heat from operating appliances such as stoves, ovens, boilers, grills, toasters, irons, refrigerators, freezers, etc.
c. Supporting and allowing the passage of air intake and exhaust ducts for ventilation and air-conditioning.

8.2.8 Plumbing Systems

i. The designer, installer and user of the perfect block shall ensure compliance with JAD/IPC for example with respect to:

a. Support wall mounted pipes for various liquid and gas fueled units.
b. Allowing the passage of pipes in walls for sewage, waste water, hot and cold water etc.
c. Allowing the passage of pipes through walls for sewage, waste water, hot and cold water etc.
d. Accommodating inadvertent leaks in or against walls.

8.2.9 Fire Systems

i. The perfect block will satisfy the requirements of the JS 314: The Jamaican Application Document for the International Fire Code (JAD/IFC and JS 306: JAD/IRC when the following are met:

a. The perfect block protect against fire of up to 4 hours. Exterior walls shall be fire rated in accordance with table 601 and 602, but no less than ½ hour fire rating shall be applied in a type V construction.

b. The smoke-density index when determined in accordance with ASTM E 84 or UL 723 shall not exceed 450, to ensure that the material will not seriously harm occupants of a building under fire during the time it takes for evacuation. This smoke-density index is also a requirement under the JAD/IRC in section R315, IRC and IBC 2009.

c. The requirements for interior finishes covered in section 8.2.2 of this report shall be met.

d. Buildings constructed with the perfect block shall be designed to ensure that all other requirements of JS 314 to be met.

8.2.10 Electrical

i. The architectural and engineering design for buildings to be constructed with the perfect block must address the following areas in order to comply with JS 316.

a. Every building supplied with electricity in Jamaica must be fitted with a panel-board to distribute power throughout the building. Panel-boards have an average minimum depth of about 87 mm (3½ inches) and must be firmly embedded in the concrete wall in the case of concealed wiring and surface mounted on the wall in the case of surface wiring. The perfect block with 150 mm (6 inches) separation between boards should be able to accommodate flush mounted panel-boards within the wall itself.

b. Concealed wiring accounts for over 85% of all building wiring in Jamaica and therefore over 85% of panel-boards are flush mounted. Flush mounted panel-boards in order to be flushed with the interior finished wall will be mounted entirely within the 50 mm (2 inch) interior finish and to a depth of 37 mm (1½inches) within the interior insulation board. The manufacturer needs to confirm if these layers are sturdy enough to anchor the panel-board and accommodate the many conduits of various sizes that must terminate in it from bottom and top. This situation applies to all sizes of the perfect block insulated composite concrete forms (ICCFs).

c. Conduit sizes to panel-boards will vary from 19mm (¾ inch) to 100 mm (4 inches) depending on the size main breaker in the panel-board. Large conduits are usually for accommodating the conductors to main or sub-main electrical feeders. In the case of residential customers the conduit size seldom passes 50 mm (2 inches).

9. CONCLUSIONS

9.1 The documents submitted by Axsumite Homes Limited as part of its application for approval of proposed perfect block building system (made from concrete and Expandable Polystyrene Styrofoam (EPS) beads) described the components and methodology for the design, construction and use of these panels in residential, factory , office units, et al for the Jamaican market. The scope, structure and content of the documentation reflect an understanding of the critical importance of meeting the performance criteria for approval and use of the IBS system and gives reasonable confidence that the client has taken the necessary steps to ensure compliance in the United States of America.

9.2 The approach and proposed design methodology, if fully applied by Axsumite Homes Limited and users should ensure compliance with critical aspects of the National Building Code of Jamaica.

9.3 Based on the information provided the perfect block can be used to construct walls of four (4) hour fire ratings. This procedure would allow the materials to be used freely in type V construction, with conditional use in types I, II, III and IV construction applications.

9.4 The Axsumite Homes Limited proposed approach to the manufacture of the perfect block to meet the requirements of the code appears to be adequate. Axsumite Homes Limited must ensure that the system and quality control requirements are met during manufacturing and installation of the perfect block.

9.5 The perfect block building system is recommended for use in the construction of buildings where design performance is determined by a registered engineer to the satisfaction of the Bureau of Standards Jamaica and the local authorities.

9.6 The absence of current and sufficient data does not allow for the system's recommendation for use where the conventional design approach is applied.

10. RECOMMENDATION

10.1 The perfect block building system be approved for use in Jamaica subject to the following:

a) The steel reinforcement for all concrete shall be designed and approved by a professional structural engineer registered under Jamaican statute. Additionally, any onsite fabrication and installation shall be done under the supervision of a professional structural engineer. Structural engineers performing this work shall have a clear understanding of the system's structural capabilities;

10.2 Sound engineering design must be done for all buildings which will utilize the system.

10.3 Proper supervision and sound construction practices be maintained throughout the construction process.

a) Whenever modifications are suggested to the system, the proposed modifications must be assessed and a new report or addendum issued.

b) The perfect block shall not be used as a dividing wall between town houses. Only concrete or concrete masonry walls are allowed in such applications.

c) Where there will be commercial retailing of the product, the manufacturer should ensure that all items are appropriately labeled to meet the relevant Jamaican Standard – JS1:Part1, JAD/IRC section R314 or R316.2 of IRC 209. Packages and containers of foam plastic insulation and foam plastic insulation components delivered to the job site shall bear the *label* of an *approved agency showing* the manufacturer's name, the product listing, product identification and information sufficient to determine that the end use will comply with the requirements.

10.4 It should be noted that these are minimum requirements and are not exhaustive. It is the responsibility of the manufacturer and local supplier to ensure that other applicable code requirements are considered and met.

End of Report.