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# ECO BUILDING SYSTEMS CORP.
# TEST REPORT

**SCOPE OF WORK**
ASTM E1886 AND ASTM E1996 TESTING ON EBS 10 INCH ASYMMETRIC INSULATED COMPOSITE CONCRETE FORM (ICCF) BLOCK WALL SYSTEM
**REPORT NUMBER**
H6867.02-801-44-R0

**TEST DATE(S)**
02/27/18 TO 03/16/18

**ISSUE DATE**
03/28/18

**RECORD RETENTION END DATE**
03/16/22

**PAGES**
20

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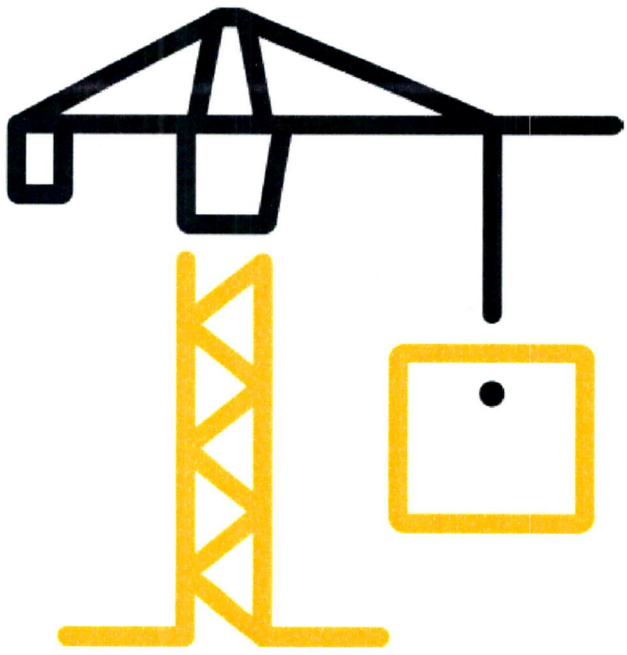

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Report No.: H6867.02-801-44-r0
Date: 03/28/18

REPORT ISSUED TO
**ECO BUILDING SYSTEMS CORP.**
8960 W Larkspur Drive, STE 105
Peoria, Arizona 85381

## SECTION 1
## SCOPE

Intertek Building & Construction (B&C) was contracted by Eco Building Systems Corp. to perform testing in accordance with ASTM E1886 and ASTM E1996 on their EBS 10 Inch Asymmetric insulated composite concrete form (ICCF) block wall system. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek B&C test facility in Plano, Texas.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

## SECTION 2
## SUMMARY OF TEST RESULTS

**Product Type**: Insulated composite concrete form (ICCF) block wall system
**Series/Model**: EBS 10 Inch Asymmetric ICCF

| TITLE | RESULTS |
|---|---|
| ±11,970 Pa (±250 psf) Design Pressure | Met performance requirements |
| Missile Impacts | Missile Level D<br>Wind Zone 4 |

For INTERTEK B&C:

| | | | |
|---|---|---|---|
| **COMPLETED BY:** | Clint Barnett | **REVIEWED BY:** | Andy Cost |
| **TITLE:** | Technician | **TITLE:** | Laboratory Manager |
| **SIGNATURE:** | Digitally Signed by: Clint Barnett | **SIGNATURE:** | Digitally Signed by: Andy Cost |
| **DATE:** | 03/28/18 | **DATE:** | 03/28/18 |

CAB:ac

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## SECTION 3
## TEST METHOD(S)

The specimens were evaluated in accordance with the following:

**ASTM E1886-13a,** *Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials*

**ASTM E1996-14a,** *Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes*

## SECTION 4
## MATERIAL SOURCE/INSTALLATION

Test specimens were provided by the client.

The specimen was installed into a C12x20 x 1/4" thick steel C-Channel buck with #5 rebar spaced 12" apart horizontally and 12" apart vertically. The rough opening allowed for a 1/8" shim space. The exterior perimeter of the wall panel was sealed with sealant. Installation of the tested product was performed by the client.

| LOCATION | ANCHOR DESCRIPTION | ANCHOR LOCATION |
|---|---|---|
| Head, Sill, Jambs | Polyurethane Spray Foam | Bottom of blocks |
| Head, Sill, Jambs | #5 rebar | Vertical and horizontal full width and height 12" on center welded to the steel perimeter frame. |

Tape and film were not used to seal against air leakage during structural testing.

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## SECTION 5
## EQUIPMENT

Calibration of test equipment was performed by Intertek B&C in accordance with AAMA 205-15.

**Cannon**: Constructed from steel piping utilizing compressed air to propel the missile
**Missile**: 2x4 Southern Pine 8' long, 9 pounds.
**Timing Device**: Electronic Beam Type
**Cycling Mechanism**: Computer controlled centrifugal blower with electronic pressure measuring device

## SECTION 6
## LIST OF OFFICIAL OBSERVERS

| NAME | COMPANY |
|---|---|
| Clint Barnett | Intertek B&C |
| Andy Cost | Intertek B&C |

## SECTION 7
## TEST SPECIMEN DESCRIPTION

**Product Type**: Insulated composite concrete form (ICCF) block wall system
**Series/Model**: EBS 10 Inch Asymmetric ICCF

**Product Size(s):**

**Test Specimens #1 - #3**

| OVERALL AREA: | WIDTH | | HEIGHT | |
|---|---|---|---|---|
| 3.04 $m^2$ (32.67 $ft^2$) | millimeters | inches | millimeters | inches |
| Overall Size | 2438 | 96 | 1245 | 49 |
| ICCF Block Size | 1219 | 48 | 305 | 12 |

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***The following descriptions apply to all specimens.***

**Frame Construction:**

**Panel Construction:**

| PANEL MEMBER | MATERIAL | DESCRIPTION |
|---|---|---|
| ICCF Block | Recycled Expanded Polystyrene (EPS) and Cement | 48"x12"x10" ICCF blocks, grout filled, and reinforced with #5 rebar |
| 1/2" Gypsum Board | Gypsum | Secured to interior part of the ICCF blocks with joint compound |
| Hard Coat Stucco | Concrete | 3/4" thick stucco was applied directly to the exterior of the ICCF blocks. |

SECTION 8
**TEST RESULTS**

The temperature during testing was 21°C (70°F). The results are tabulated as follows:

**ASTM E1886, *LARGE MISSILE IMPACT***

**Conditioning Temperature:** 21°C (70°F)
**Missile Weight:** 4082 g (9.00 lbs)
**Missile Length:** 2.4 m (96")
**Muzzle Distance from Test Specimen:** 3.66 m (17')

**Test Specimen #1**: Orientation within ±5° of horizontal

| IMPACT | #1 | #2 |
|---|---|---|
| MISSILE VELOCITY | 15.30 m/s (50.20 fps) | 15.33 m/s (50.30 fps) |
| IMPACT AREA | Center Wall Panel | Top Right Corner |
| OBSERVATIONS | Missile hit target area, No damage beyond the allowable | Missile hit target area, No damage beyond the allowable |
| RESULTS | Pass | Pass |

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**Test Specimen #2**: Orientation within ±5° of horizontal

| IMPACT | #1 | #2 |
|---|---|---|
| MISSILE VELOCITY | 15.48 m/s (50.80 fps) | 15.30 m/s (50.20 fps) |
| IMPACT AREA | Bottom left Corner | Center |
| OBSERVATIONS | Missile hit target area, No damage beyond the allowable | Missile hit target area, No damage beyond the allowable |
| RESULTS | Pass | Pass |

**Test Specimen #3**: Orientation within ±5° of horizontal

| IMPACT | #1 | #2 |
|---|---|---|
| MISSILE VELOCITY | 15.27 m/s (50.10 fps) | 15.24 m/s (50.00 fps) |
| IMPACT AREA | Center Wall Panel | Top Right Corner |
| OBSERVATIONS | Missile hit target area, | Missile hit target area, |
| RESULTS | Pass | Pass |

***Note**: See Intertek B&C Sketch #1 for impact locations.*

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**TEST REPORT FOR ECO BUILDING SYSTEMS CORP.**
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**ASTM E1886, AIR PRESSURE CYCLING**

**Test Specimen #1**:
**Design Pressure:** ±11,970 Pa (±250.00 psf)

**Positive Pressure**

| PRESSURE RANGE Pa (psf) | NUMBER OF CYCLES | AVERAGE CYCLE TIME (seconds) | OBSERVATIONS |
|---|---|---|---|
| 2394 to 3175 (50 to125) | 3500 | 3.00 | No damage beyond the allowable |
| 0 to 7182 (0 to 150) | 300 | 3.00 | No damage beyond the allowable |
| 3175 to 9576 (125 to 200) | 600 | 3.00 | No damage beyond the allowable |
| 3591 to 11,970 (75 to 250) | 100 | 3.00 | No damage beyond the allowable |

**Negative Pressure**

| PRESSURE RANGE Pa (psf) | NUMBER OF CYCLES | AVERAGE CYCLE TIME (seconds) | OBSERVATIONS |
|---|---|---|---|
| 3591 to 11,970 (75 to 250) | 50 | 3.00 | No damage beyond the allowable |
| 3175 to 9576 (125 to 200) | 1050 | 3.00 | No damage beyond the allowable |
| 0 to 7182 (0 to 150) | 50 | 3.00 | No damage beyond the allowable |
| 2394 to 3175 (50 to 125) | 3350 | 3.00 | No damage beyond the allowable |

**Result**: Pass

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**ASTM E1886, AIR PRESSURE CYCLING**

**Test Specimen #2**:
**Design Pressure:** ±11,970 Pa (±250.00 psf)

**Positive Pressure**

| PRESSURE RANGE Pa (psf) | NUMBER OF CYCLES | AVERAGE CYCLE TIME (seconds) | OBSERVATIONS |
|---|---|---|---|
| 2394 to 3175 (50 to125) | 3500 | 3.00 | No damage beyond the allowable |
| 0 to 7182 (0 to 150) | 300 | 3.00 | No damage beyond the allowable |
| 3175 to 9576 (125 to 200) | 600 | 3.00 | No damage beyond the allowable |
| 3591 to 11,970 (75 to 250) | 100 | 3.00 | No damage beyond the allowable |

**Negative Pressure**

| PRESSURE RANGE Pa (psf) | NUMBER OF CYCLES | AVERAGE CYCLE TIME (seconds) | OBSERVATIONS |
|---|---|---|---|
| 3591 to 11,970 (75 to 250) | 50 | 3.00 | No damage beyond the allowable |
| 3175 to 9576 (125 to 200) | 1050 | 3.00 | No damage beyond the allowable |
| 0 to 7182 (0 to 150) | 50 | 3.00 | No damage beyond the allowable |
| 2394 to 3175 (50 to 125) | 3350 | 3.00 | No damage beyond the allowable |

**Result**: Pass

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**ASTM E1886, AIR PRESSURE CYCLING**

**Test Specimen #3**:
**Design Pressure:** ±11,970 Pa (±250.00 psf)

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| 3175 to 9576 (125 to 200) | 600 | 3.00 | No damage beyond the allowable |
| 3591 to 11,970 (75 to 250) | 100 | 3.00 | No damage beyond the allowable |

**Negative Pressure**

| PRESSURE RANGE Pa (psf) | NUMBER OF CYCLES | AVERAGE CYCLE TIME (seconds) | OBSERVATIONS |
|---|---|---|---|
| 3591 to 11,970 (75 to 250) | 50 | 3.00 | No damage beyond the allowable |
| 3175 to 9576 (125 to 200) | 1050 | 3.00 | No damage beyond the allowable |
| 0 to 7182 (0 to 150) | 50 | 3.00 | No damage beyond the allowable |
| 2394 to 3175 (50 to 125) | 3350 | 3.00 | No damage beyond the allowable |

**Result**: Pass

SECTION 9
**CONCLUSION**

The specimen(s) tested met the performance requirements set forth in the referenced test procedures for a ±11,970 Pa (±250.00 psf) Design Pressure with missile impacts corresponding to Missile Level D and Wind Zone 4. The specimens met the requirements of Section 7 of ASTM E1996.

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## SECTION 10
## PHOTOGRAPHS


**Photo No. 1**
**Test wall under construction**

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**Photo No. 2**
**Completed Test Wall**

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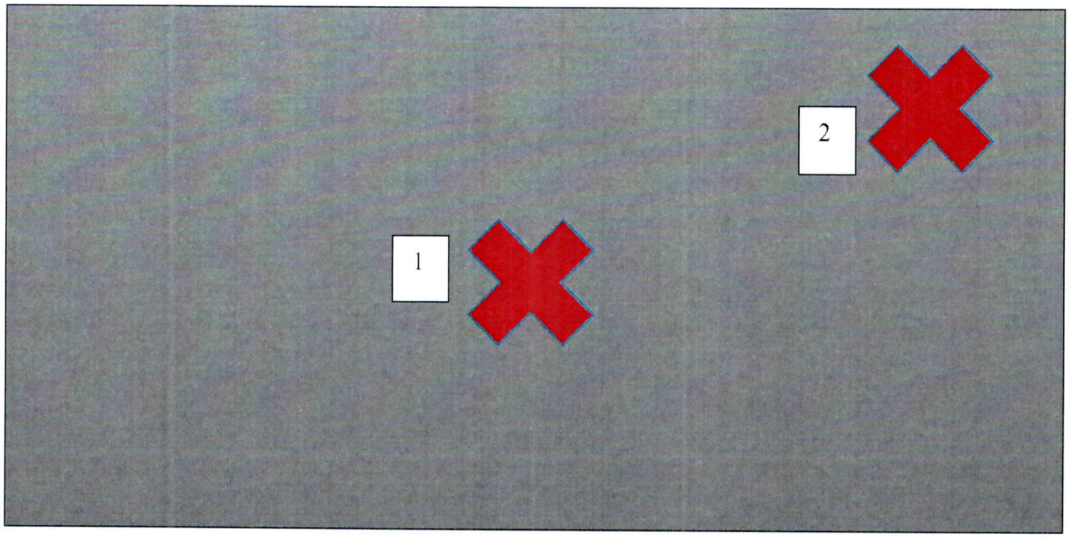
## SECTION 11
SKETCHES




**Sketch # 1**
**Specimen #1 Impact Locations**

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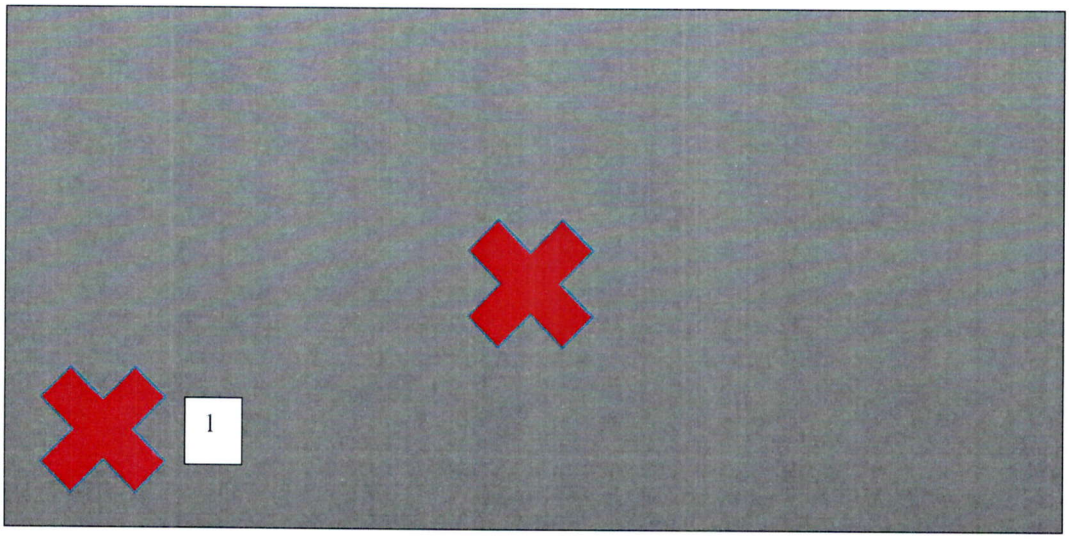


**Sketch # 2**
**Specimen #2 Impact Locations**

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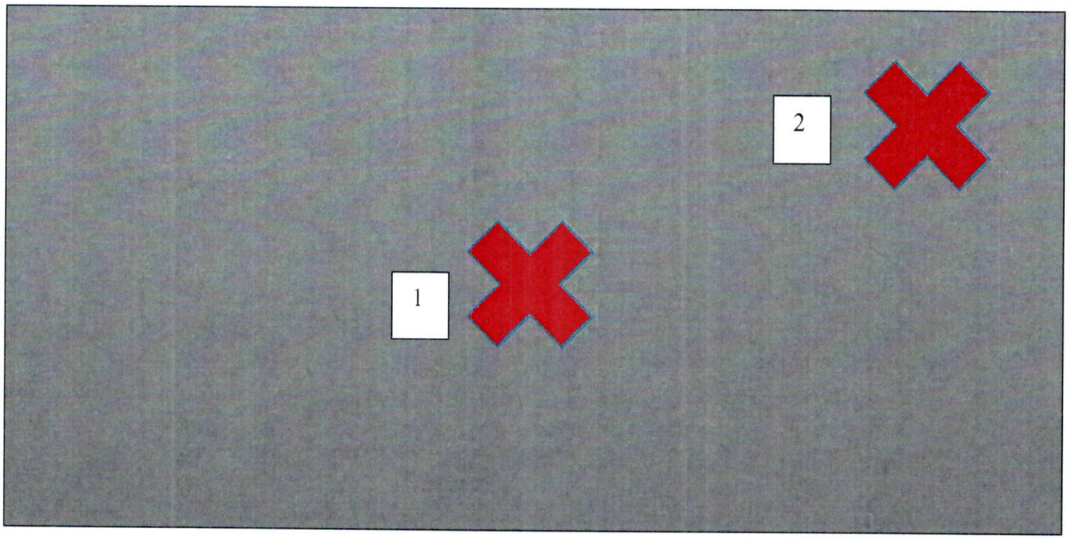


**Sketch # 3**
**Specimen #3 Impact Locations**

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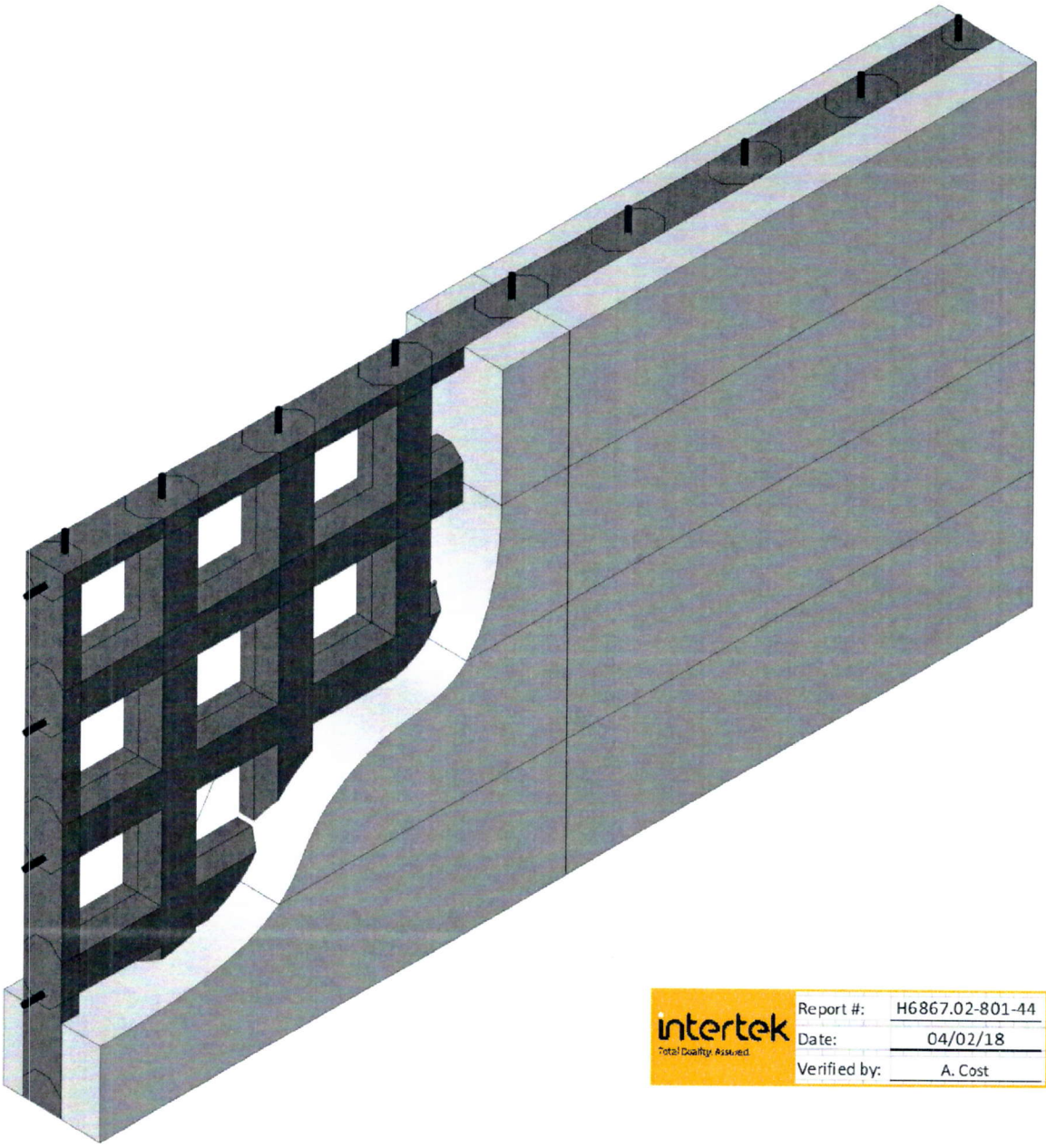
SECTION 12
## DRAWINGS

The test specimen drawings have been reviewed by Intertek B&C and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.

***Note**: Complete drawings packet on file with Intertek B&C.*



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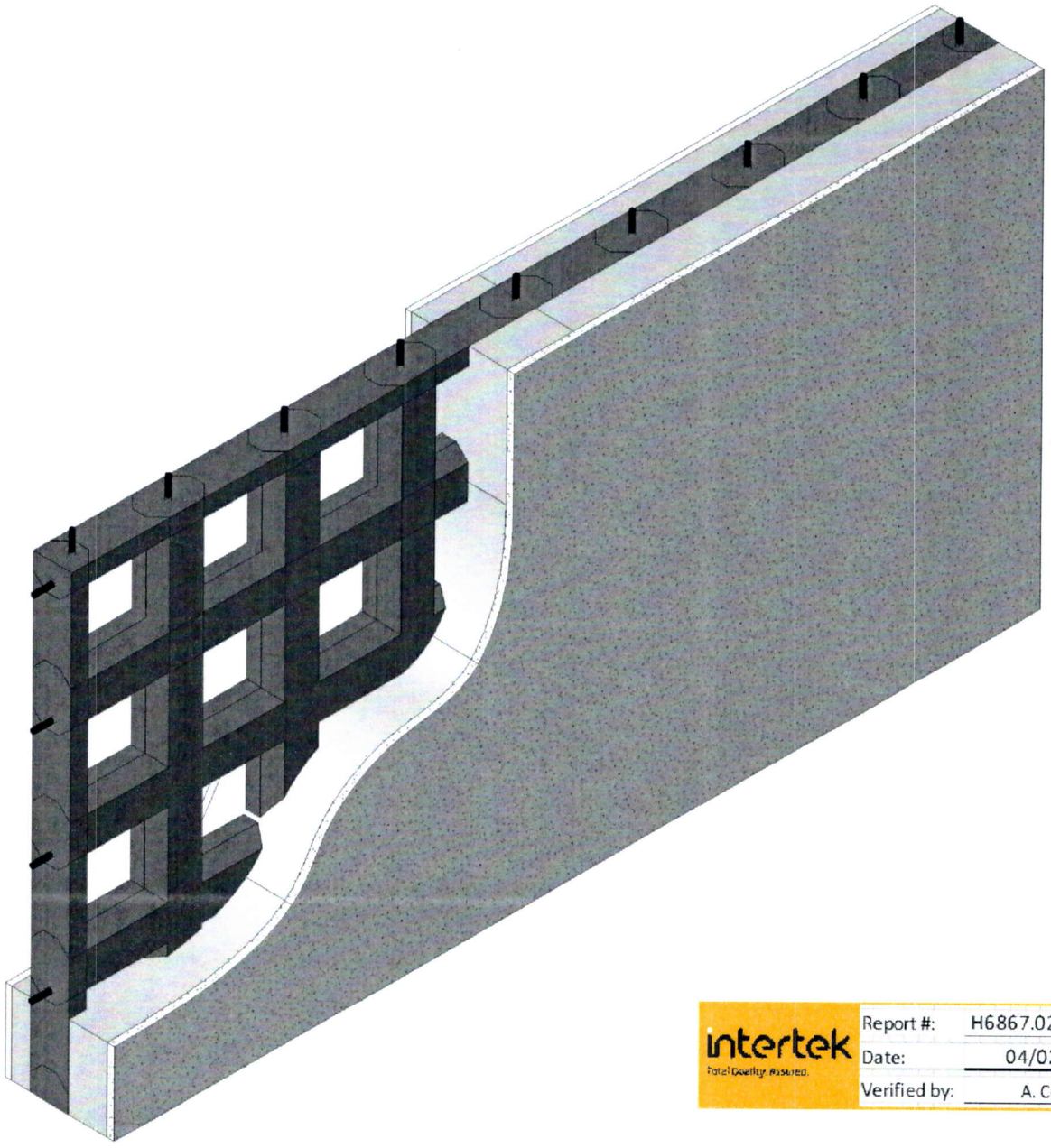
| Verified by: | A. Cost |



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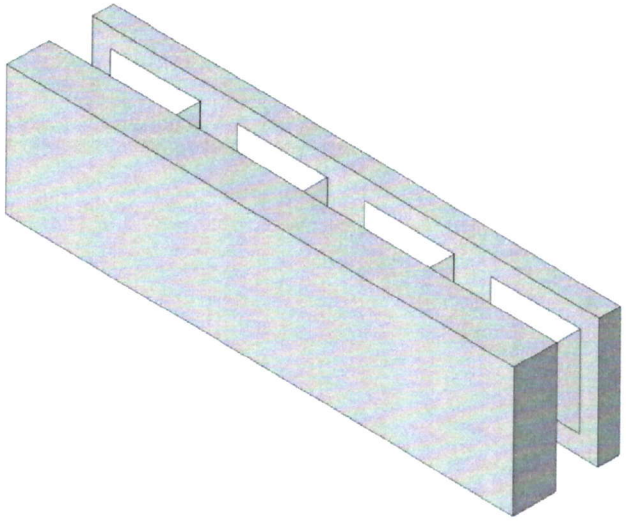
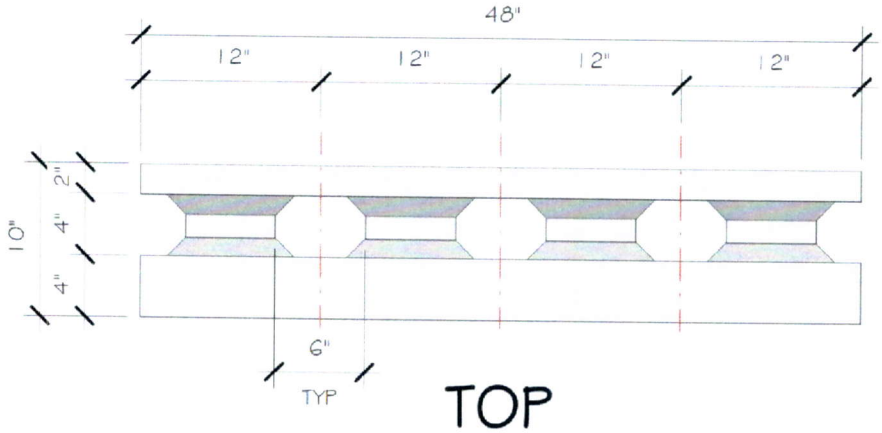
**Eco Building Systems Corp.** ™

# EBS 10 INCH ASYMMETRIC BLOCK SPECIFICATIONS



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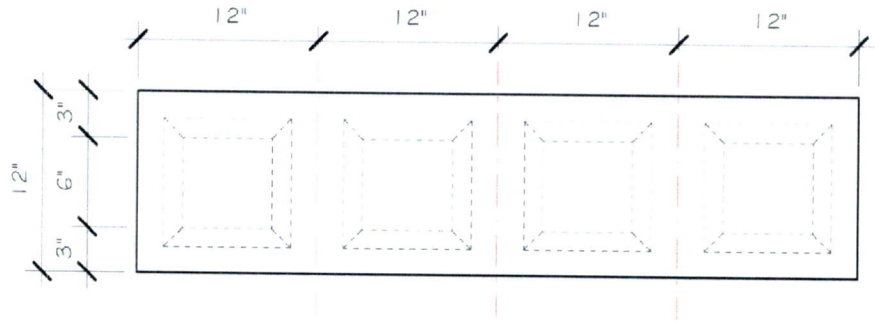
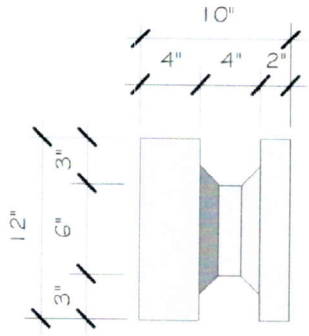



FRONT (WIREFRAME VIEW)




RIGHT

| | | |
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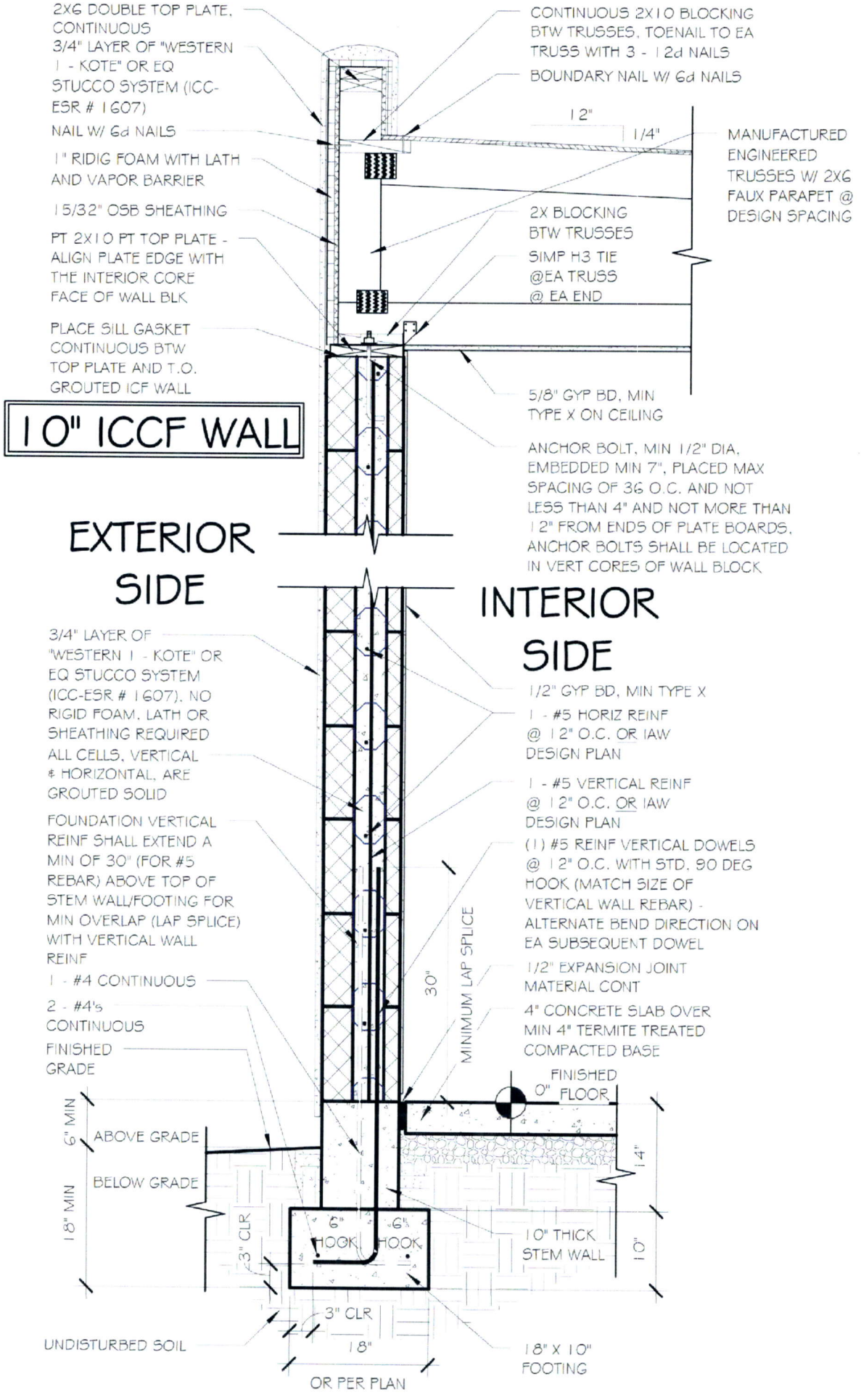
# CONCRETE & ICCF WALL

## 10" ICCF WALL



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SECTION 13
## REVISION LOG

| REVISION # | DATE | PAGES | REVISION |
|---|---|---|---|
| 0 | 03/28/18 | N/A | Original Report Issue |