

# BOCA EVALUATION SERVICES, INC.

## BOCA RESEARCH REPORT NO.



# 97-72

TM

A Participating Member of the NES, Inc.



### DIVISION 09 - FINISHES

### SECTION 09260 - GYPSUM BOARD SYSTEMS

### UNIMAST AREA SEPARATION WALL

UNIMAST INCORPORATED  
9595 WEST GRAND AVE.  
FRANKLIN PARK, IL 60131

### 1.0 DESCRIPTION OF EVALUATION

This report evaluates the use of a UNIMAST Area Separation Wall as a nonloadbearing, interior, fire wall/party wall, fire separation assembly, or fire partition where the required fireresistance rating is 2 hours or less, through the review of physical and fire test data.

This report also evaluates United States Gypsum (USG) Sheetrock Brand Gypsum Liner Panel, Type SLX, National Gypsum Gold Bond Fire-Shield Gypsum Liner Panel, Type X, and GyProc® Fireguard® Shaftliner, Type X, for compliance with the referenced standard listed below through a review of data submitted:

ASTM C442-92 *Standard Specification for Gypsum Backing Board and Coreboard*

### 2.0 DESCRIPTION AND USE OF PRODUCT

#### 2.1 GENERAL DESCRIPTION

The UNIMAST Area Separation Wall is a nonloadbearing wall assembly intended for use as a fire wall/party wall, fire separation assembly, or fire partition with a maximum required fireresistance rating of 2 hours. The wall assembly consists of two layers of gypsum liner panel, steel H-studs, C-runners, and aluminum clips, and is limited in height to 44 ft (13 411 mm). See Section 2.2 of this report for a detailed description of the system components. Figures 1, 2, and 3 of this report illustrate the basic system.

#### 2.2 SYSTEM COMPONENTS

##### 2.2.1 Steel Framing

The UNIMAST C-Runner is a hot dipped, galvanized, 2 in. wide (51 mm) by 0.0179 in. thick (0.45 mm) 'C'-shaped steel

track with 1 in. (25 mm) legs. The C-runners are fabricated from steel which meets the requirements of ASTM A 653-95 with a minimum yield strength of 33,000 lbf/in<sup>2</sup> (227.5 MPa). The C-runners are 10 ft (3048 mm) in length. See Figure 4 of this report for an illustration of the UNIMAST C-Runner.

The C-runners are used to secure the H-stud to the floor and ceiling, and are used back-to-back in installations where the UNIMAST Area Separation Wall assemblies are stacked vertically.

25-gauge UNIMAST H-Stud is a hot dipped, galvanized, 2 in. wide (51 mm) by 0.0179 in. thick (0.45 mm) 'H'-shaped steel stud with 1.375 in. (35 mm) flanges. The H-studs are fabricated from steel which meets the requirements of ASTM A 653-95 with a minimum yield strength of 33,000 lbf/in<sup>2</sup> (227.5 MPa). See Figure 4 of this report for an illustration of the UNIMAST H-Stud.

The H-studs are used to secure the gypsum liner panels in place under fire conditions.

##### 2.2.2 Gypsum Panels

USG Sheetrock Brand Gypsum Liner Panel, Type SLX, is a 1 in. thick (25 mm), proprietary fireresistant gypsum core encased in multilayered, moisture-resistant green paper facers which comply with ASTM C442-92. The panels have beveled edges, a nominal density of 49 lbf/ft<sup>3</sup> (787 kg/m<sup>3</sup>), and are produced in sheets 24 in. (610 mm) in width and up to 16 ft (4877 mm) in length.

National Gypsum Gold Bond Fire-Shield Gypsum Liner Panel, Type X, is a 1 in. thick (25 mm), proprietary fire-resistant gypsum core encased in multilayered, moisture-resistant green paper facers which comply with ASTM C442-92. The panels have a nominal density of 46 lbf/ft<sup>3</sup> (738 kg/m<sup>3</sup>) and are produced in sheets 24 in. (610 mm) in width and 12 ft (3658 mm) in length.

GyProc® Fireguard® Shaftliner, Type X, is a 1 in. (25.4 mm) thick, proprietary fireresistant gypsum core encased in multilayered, moisture-resistant green paper facers which comply with ASTM C442-92. The panels have beveled edges, a nominal density of 47 lbf/ft<sup>3</sup> (752 kg/m<sup>3</sup>), and are produced in sheets 24 in. (610 mm) in width and up to 12 ft (3658 mm) in length.

Please contact BOCA Evaluation Services, Inc., with any questions you may have regarding this report. Additionally, please contact us if you have any information on the performance of the product described herein which is contrary to this report. This report is subject to the limitations listed herein and to the specific product, data and test reports submitted by the applicant requesting this report. Independent tests were not performed by BOCA Evaluation Services, Inc., and BOCA Evaluation Services, Inc., specifically does not make any warranty, either expressed or implied, as to any findings or other matter in this report or as to any product covered by this report. Evaluation reports are not to be construed as representing aesthetics or any other attributes not specifically addressed nor as an endorsement or recommendation for the use of the subject of the report. This disclaimer includes, but is not limited to, merchantability.

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The two layers of 1 in. thick (25 mm) shaft liner panels contribute to the 2-hour fireresistance rating of the UNIMAST Area Separation Wall.

### 2.2.3 Aluminum Clips

**UNIMAST Aluminum Breakaway Clips** are 2 in. wide (51 mm) by 0.060 in. thick (1.5 mm) 'L'-shaped clips with 2 in. (51 mm) and 2.5 in. (64 mm) legs. The clips are fabricated from aluminum which meets the requirements of ASTM B 209-92a, Alloy 5052, and have a melting point of 1220°F (660°C). See Figure 4 of this report for an illustration of the UNIMAST Aluminum Breakaway Clips.

The aluminum angle clips are used in the area separation wall assembly between the H-stud wall assembly and both sides of adjacent framing members as shown in Figures 2 and 3 of this report. The aluminum clips are designed to soften and break away, permitting construction damaged by fire to disengage and collapse without collapse of the UNIMAST Area Separation Wall.

### 2.2.4 Accessories

**Mechanical Fasteners** include two 7 x 7/16 in. (178 x 11.1 mm) pan-head or hex-head screws which attach the aluminum clip to the H-stud. One 1 in. (25 mm) Type 'W' screw shall be used to attach the aluminum clip to adjacent wood framing.

For installation of stacked UNIMAST Area Separation Wall assemblies, an inverted C-runner shall be attached to the top of the area separation wall below for attachment of the area separation wall above, with double 7 x 7/16 in. (178 x 11.1 mm) Type 'S' screws at 24 in. (610 mm) o.c. See Figure 2 of this report for an example of this installation.

## 3.0 CODE ANALYSIS OF SUBMITTED INFORMATION

The following data were submitted by the proponent for demonstration of compliance with the respective code sections listed above each item of information. The basis is the *BOCA National Building Code/1996*.

### 3.1 FIRERESISTANCE RATING

#### Code Section 704.1.1 Fireresistance ratings

#### INFORMATION SUBMITTED:

##### 3.1.1 USG Sheetrock Brand Gypsum Liner Panel, Type SLX

Warnock Hersey International, Fire Laboratories Division, Report No. WHI 495-1288, dated November 4, 1994, was submitted and contains test results which indicate that the UNIMAST Area Separation Wall met the requirements for a 2-hour fireresistance rating when tested in accordance with ASTM E119.

A load of 377 lbf/ft was maintained on the area separation portion of the test assembly [steel 'H' studs with 2 layers of 1 in. (25 mm) thick USG Sheetrock Brand Gypsum Liner Panel, Type SLX] for the full duration of the fire and hose stream tests. This load simulates the dead load of a 44 ft (13 411 mm) high section of this area separation wall.

##### 3.1.2 National Gypsum Gold Bond Fire-Shield Gypsum Liner Panel, Type X

Warnock Hersey International, Fire Laboratories Division, Report No. WHI 495-1299, dated May 4, 1995, was submitted and contains test results which indicate that the UNIMAST Area Separation Wall met the requirements for a 2-hour fireresistance rating when tested in accordance with ASTM E119.

A load of 377 lbf/ft was maintained on the area separation portion of the test assembly [steel 'H' studs with 2 layers of 1 in. (25 mm) thick National Gypsum Gold Bond Fire-Shield Gypsum Liner Panel, Type X] for the full duration of the fire and hose stream tests. This load simulates the dead load of a 44 ft (13 411 mm) high section of this area separation wall.

##### 3.1.3 GyProc® Fireguard® Shaftliner, Type X

Warnock Hersey International, Fire Laboratories Division, Report No. WHI 495-1365/1366, dated July 29, 1997, was submitted and contains test results which indicate that the UNIMAST Area Separation Wall met the requirements for a 2-hour fireresistance rating when tested in accordance with ASTM E119.

A load of 377 lbf/ft was maintained on the area separation portion of the test assembly [steel 'H' studs with 2 layers of 1 in. (25 mm) thick GyProc® Fireguard® Shaftliner, Type X] for the full duration of the fire and hose stream tests. This load simulates the dead load of a 44 ft (13 411 mm) high section of this area separation wall.

## 3.2 FIRE WALLS AND PARTY WALLS

### Code Section 707.1 General

#### Code Section 704.4.1.1 Elementary materials

#### INFORMATION SUBMITTED:

##### 3.2.1 USG Sheetrock Brand Gypsum Liner Panel, Type SLX

Underwriters Laboratories File Report No. R4615, Project 88NK123356, dated August 19, 1988, was submitted and contains test results which indicate that the United States Gypsum Company, 1 in., Type SLX, Sheetrock brand gypsum liner panels met the criteria stated in Section 704.4.1.1 of the *BOCA National Building Code/1996* for a noncombustible material when tested in accordance with ASTM E136.

The test report described in Section 3.1.1 of this report contains results which demonstrate that the adjacent solid wall construction on the fire side of the UNIMAST Area Separation Wall test assembly disengaged from the H-stud flanges without adversely affecting the structural integrity of the wall. The test observations indicated that the aluminum clips which secure the area separation wall assembly to the adjacent framing melted. The wall system remained structurally sound and the fire barrier remained intact.

##### 3.2.2 National Gypsum Gold Bond Fire-Shield Gypsum Liner Panel, Type X

CertainTeed Research and Development Laboratory, Insulation Group, Project No. 70002, Assignment No. 860063A, dated March 4, 1986, was submitted and contains test results which indicate that 1 in. thick (25.4 mm) National Gypsum

Gold Bond Fire-Shield Gypsum Liner Panels, Type X, met the criteria stated in Section 704.4.1.1 of the *BOCA National Building Code/1996* for a noncombustible material when tested in accordance with ASTM E136.

The test report described in Section 3.1.2 of this report contains results which demonstrate that the adjacent solid construction on the fire side of the UNIMAST Area Separation Wall test assembly disengaged from the H-stud flanges without adversely affecting the structural integrity of the wall. The test observations indicated that the aluminum clips which secure the area separation wall assembly to the adjacent framing melted. The wall system remained structurally sound and the fire barrier remained intact.

### 3.2.3 GyProc® Fireguard® Shaftliner, Type X

Southwest Research Institute, Department of Fire Technology, Project No. 01-4510-589-b, dated August 21, 1992, was submitted and contains test results which indicate that 1 in. thick (25 mm) GyProc® Fireguard® Shaftliner, Type X, met the criteria stated in Section 704.4.1.1 of the *BOCA National Building Code/1996* for a noncombustible material when tested in accordance with ASTM E136.

The test report described in Section 3.1.3 of this report contains results which demonstrate that the adjacent solid construction on the fire side of the UNIMAST Area Separation Wall test assembly disengaged from the H-stud flanges without adversely affecting the structural integrity of the wall. The test observations indicated that the aluminum clips which secure the area separation wall assembly to the adjacent framing melted. The wall system remained structurally sound and the fire barrier remained intact.

## 3.3 FIRE SEPARATION ASSEMBLIES

### Code Section 709.1 General

#### INFORMATION SUBMITTED:

Fire-resistance rating is demonstrated in Section 3.1 of this report.

## 3.4 FIRE PARTITIONS

### Code Section 711.1 General

#### INFORMATION SUBMITTED:

Fire-resistance rating is demonstrated in Section 3.1 of this report.

## 3.5 GYPSUM BOARD MATERIALS

### Code Section 2503.2 Standards

### Code Section 106.4 Alternative materials and methods

#### INFORMATION SUBMITTED:

Due to the proprietary nature of the 1 in. thick (25 mm) United States Gypsum (USG) Sheetrock Brand Gypsum Liner Panel, Type SLX, 1 in. thick (25 mm) National Gypsum Gold Bond Fire-Shield Gypsum Liner Panel, Type X; and 1 in. (25 mm) GyProc® Fireguard® Shaftliner, Type X, there is not a consensus standard for these panels.

In lieu of ASTM C36, which is intended for testing of gypsum coreboards which are up to 5/8 in. (15.9 mm) thick, ASTM

C442 tests were performed. ASTM C442-92 evaluates the same properties as ASTM C36 [flexural strength, humidified deflection, core, end, and edge hardness, and nail pull resistance], but is intended for gypsum coreboards which are up to 1 in. thick (25 mm).

Evaluation of the above-mentioned products as alternative materials is based on the use of these products in the test reports presented in Sections 3.1 and 3.2 of this report, and the label that is affixed to the gypsum liner panels. The label indicates that the panels have been tested by an approved agency and that the agency performs periodic inspections to verify that the proprietary formulation of the gypsum liner panels is maintained.

### 3.5.1 USG Sheetrock Brand Gypsum Liner Panel, Type SLX

Underwriters Laboratories, Inc., Follow-up Service Procedure Bulletins: File R-1319-000, dated December 20, 1982, demonstrating that the proprietary formulation of the gypsum liner panels is being maintained, and File R4615, dated August 19, 1988, demonstrating flexural strength, humidified deflection, core, end, and edge hardness, and dimensions and permissible variations tests were performed in accordance with ASTM C442. The 1 in. thick (25 mm) United States Gypsum Company, Type SLX, Sheetrock Brand Gypsum Liner Panels met the standard specification requirements for gypsum backing board and coreboard of ASTM C442.

### 3.5.2 National Gypsum Gold Bond Fire-Shield Gypsum Liner Panel, Type X

Pittsburgh Testing Laboratory, Report No. 1-86-G3, dated February 20, 1986, was submitted and contains test results which demonstrate compliance with the flexural strength, humidified deflection, core, end, and edge hardness, and dimensions and permissible variations tests in accordance with ASTM C473. The 1 in. thick (25 mm) National Gypsum Gold Bond Fire-Shield Gypsum Liner Panel, Type X, met the standard specification requirements for gypsum backing board and coreboard of ASTM C442.

### 3.5.3 GyProc® Fireguard® Shaftliner, Type X

Warnock Hersey International, Inc., report, dated August 14, 1992, was submitted and contains test results which demonstrate compliance with the strength, humidified deflection, core, end, and edge hardness, and dimensions and permissible variations tests in accordance with ASTM C442. The 1 in. thick (25 mm) GyProc® Fireguard® Shaftliner, Type X, met the standard specification requirements for gypsum backing board and coreboard of ASTM C442.

## 4.0 INSTRUCTIONS TO THE CODE OFFICIAL

The UNIMAST Area Separation Wall has been evaluated for compliance with the 1996 editions of the *BOCA National Codes*. This report is limited to the application and products as stated herein. This evaluation is based solely upon information provided to BOCA Evaluation Services, Inc., by UNIMAST, and has not been independently verified. BOCA-ES intends that the report be used by the code official to determine that UNIMAST Area Separation Walls comply with the code requirements specifically addressed in Section 3.0 and referenced standard specifically addressed in Section 1.0 of this report, provided that this product is installed in accordance with the following limitations:

## Limitations

- 4.1 This report is subject to annual certification. Reports that are not certified shall not be used or referred to. In order to determine the status of certification of this report, contact BOCA Evaluation Services Inc., or consult the latest addition of the *National Product Evaluation Listing* published periodically in the BOCA magazine.
- 4.2 Evaluation of the UNIMAST Area Separation Wall is limited to nonloadbearing interior applications where the required fire resistance rating is 2 hours or less. Evaluation of loads are limited to horizontal loads of 5 lbf/ft<sup>2</sup> (239 Pa) as specified in Section 1606.9 of the *BOCA National Building Code/1996*. Evaluation of all other loads are outside the scope of this report.
- 4.3 UNIMAST Area Separation Walls used in exterior wall applications, and the evaluation of resistance to in-plane and lateral loads caused by wind or seismic conditions, is beyond the scope of this report.
- 4.4 Firestopping, continuity, penetration protection and opening requirements for fire walls/party walls, fire separation assemblies, and fire partitions shall be in accordance with the *BOCA National Building Code/1996*. The evaluation of penetrations through UNIMAST Area Separation Walls shall be in accordance with Section 714.0 of the *BOCA National Building Code/1996*, the design of which are beyond the scope of this report.
- 4.5 Evaluation of the UNIMAST Area Separation Wall is limited to those components listed in Section 2.2 of this report.
- 4.6 **Installation:**
- 4.6.1 UNIMAST Area Separation Walls shall be installed in accordance with the manufacturer's printed installation instructions, titled *Step-by-Step Installation Instructions*, dated January 12, 1995, and subject to the provisions of this report.
- 4.6.2 UNIMAST shall supply current installation instructions that describe the proper handling of the product, methods of installation, types of fasteners, and the required fastening schedule.
- 4.6.3 A minimum 3/4-inch (19.1 mm) clear air space shall be maintained between UNIMAST Area Separation Walls and the adjacent solid wall construction and adjacent framing members.
- 4.6.4 UNIMAST Area Separation Wall assemblies shall be limited to a maximum height of 44 ft (13 411 mm). When the total height of a UNIMAST Area Separation Wall exceeds 23 feet (7010 mm) an additional aluminum clip shall be installed at the mid-span of each H-stud on both sides of the area separation assembly.
- 4.6.5 UNIMAST Area Separation Walls shall be protected from the effects of weather during construction. In cold weather and during joint finishing, temperatures within the building shall be maintained within the range of 55 to 70°F (13 to 21°C).

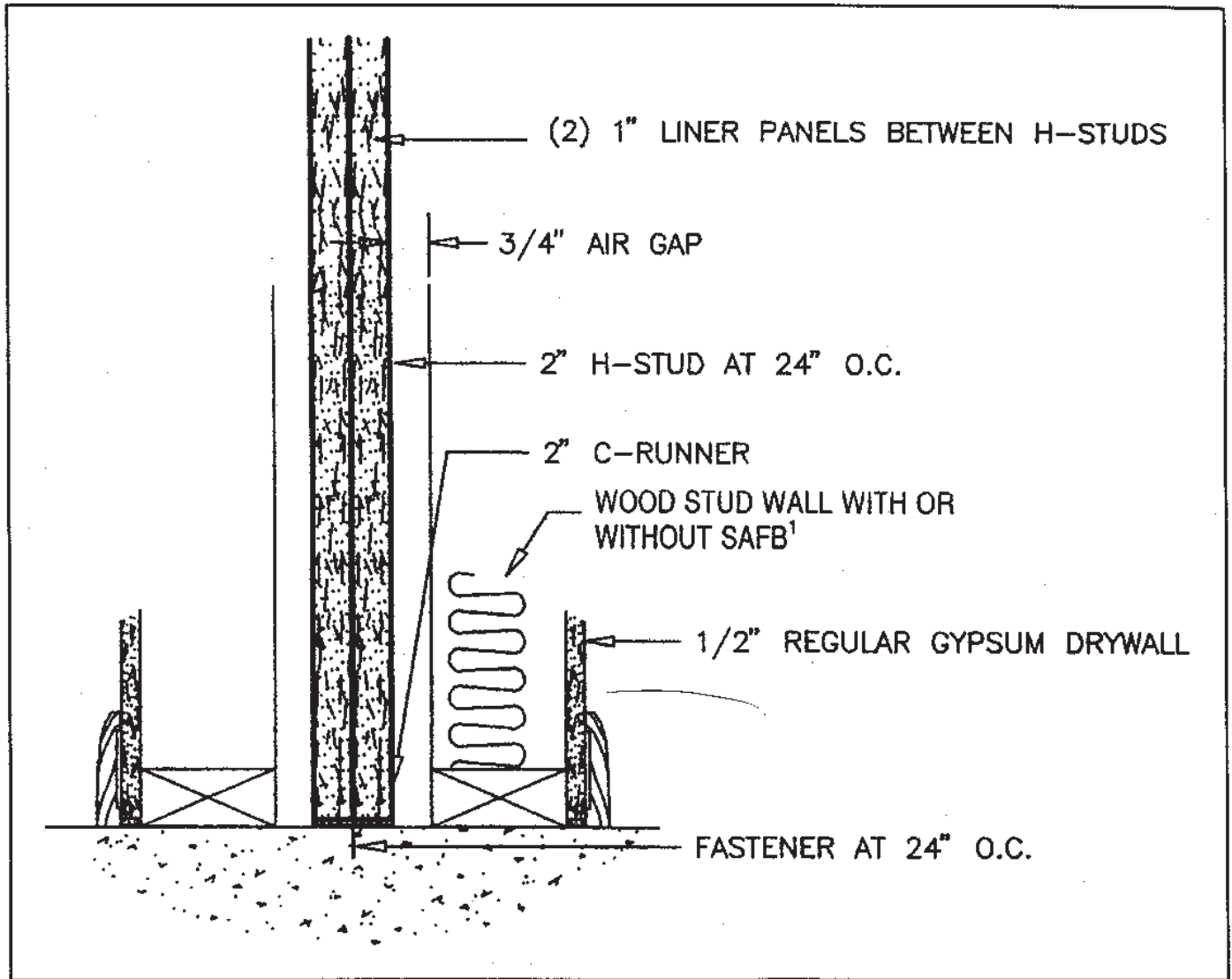
## 5.0 INFORMATION REQUIRED ON CONSTRUCTION DOCUMENTS

To aid in the use of this report, the following represents the minimum level of information to be reflected on construction documents in order to determine compliance with this research report.

- 5.1 The language "See BOCA Evaluation Services, Inc., Research Report No. 97-72".
- 5.2 The fire wall/party wall, fire separation assembly, or fire partition to be constructed in accordance with this report shall be designated as a UNIMAST Area Separation Wall.
- 5.3 Construction documents shall indicate the following:
- 5.3.1 UNIMAST Area Separation Wall height;
- 5.3.2 A minimum 3/4-in. (19.1 mm) clear air space between the UNIMAST Area Separation Wall and adjacent framing members;
- 5.3.3 H-Stud spacing;
- 5.3.4 Mechanical fastener size, type and spacing;
- 5.3.5 Aluminum clip spacing;
- 5.3.6 Mechanical fasteners size, type and spacing;
- 5.3.7 Details of all penetrations through UNIMAST Area Separation Wall;
- 5.3.8 Detailed section of the UNIMAST Area Separation Wall which indicates all assembly components.
- 5.4 Specifications shall include material and installation requirements. All gypsum board materials, installation, and accessories shall comply with the appropriate standards in accordance with Sections 3.1 and 3.3 of this report and the *BOCA National Building Code/1996*. The specific limitations listed in this report shall also be addressed.

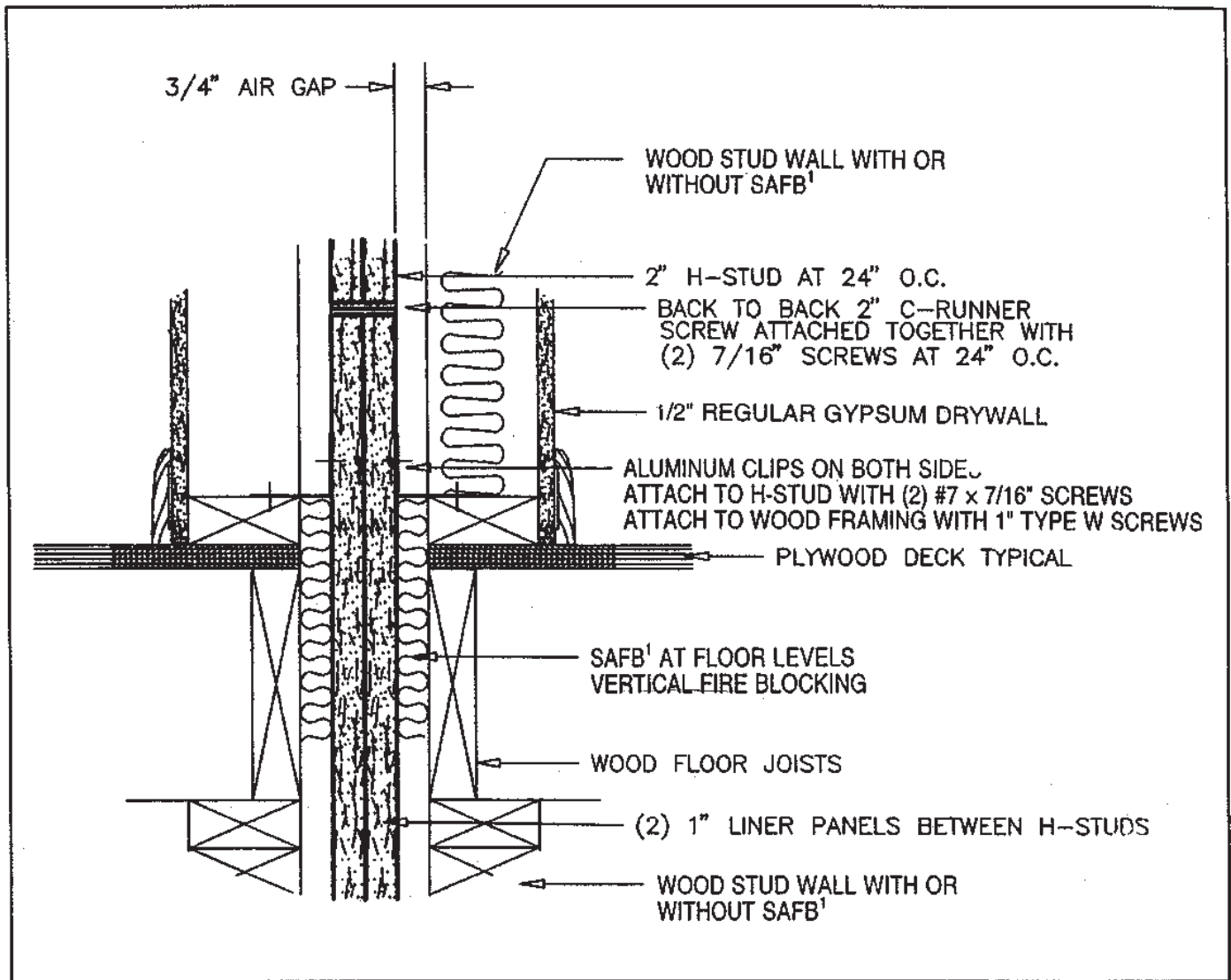
## 6.0 IDENTIFICATION

All UNIMAST Area Separation Wall components described in this report, or their packaging, shall be marked at the plant with the identifying language, "See BOCA Evaluation Services, Inc., Research Report No. 97-72."



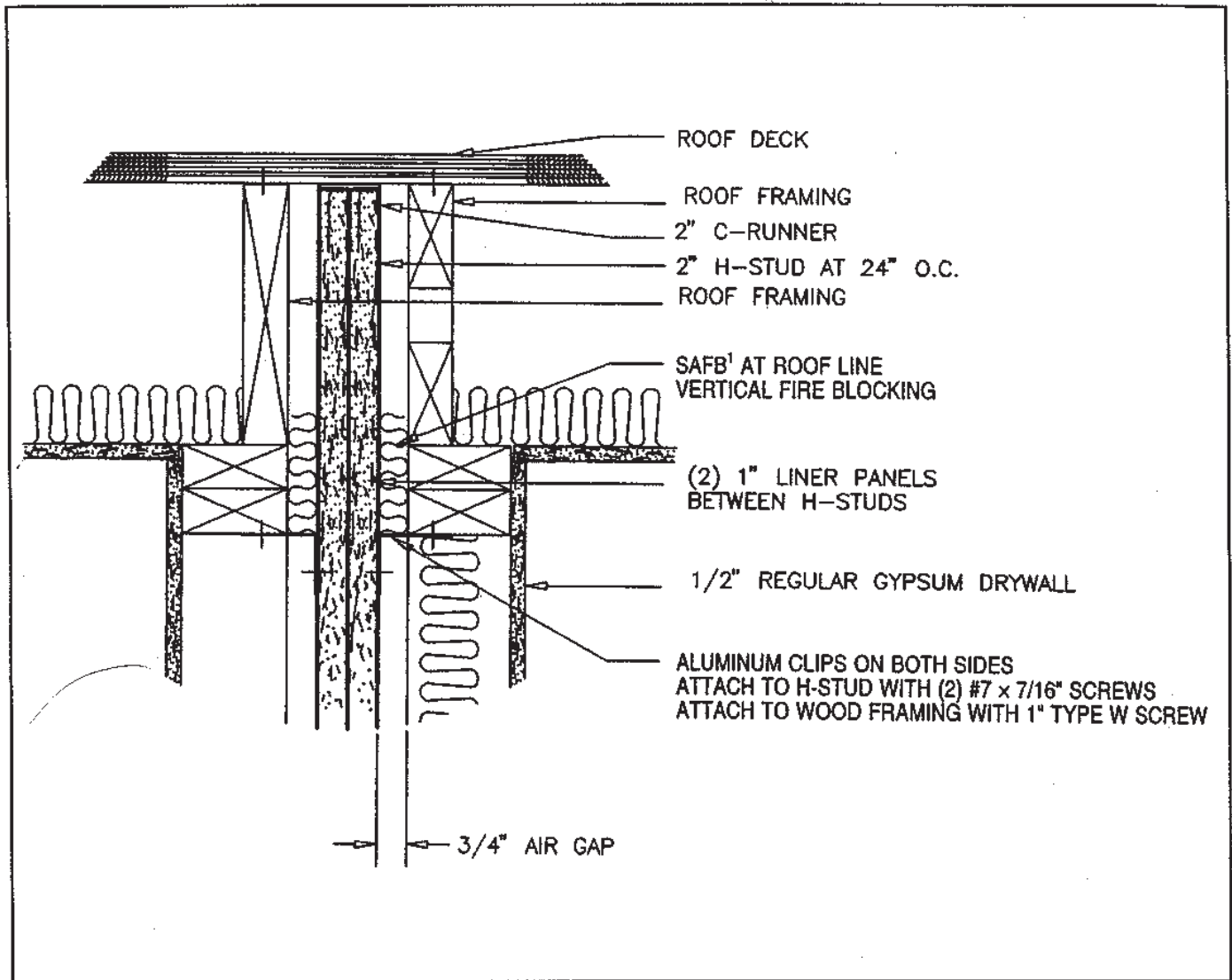
<sup>1</sup> Sound Attenuation Fire Blanket as tested per ASTM E119.

Figure 1\*  
AREA SEPARATION WALL AT FOUNDATION



<sup>1</sup> Sound Attenuation Fire Blanket as tested per ASTM E119.

Figure 2\*  
 AREA SEPARATION WALL AT INTERMEDIATE FLOOR



<sup>1</sup> Sound Attenuation Fire Blanket as tested per ASTM E119.

**Figure 3\***  
**AREA SEPARATION WALL AT ROOF DECK**

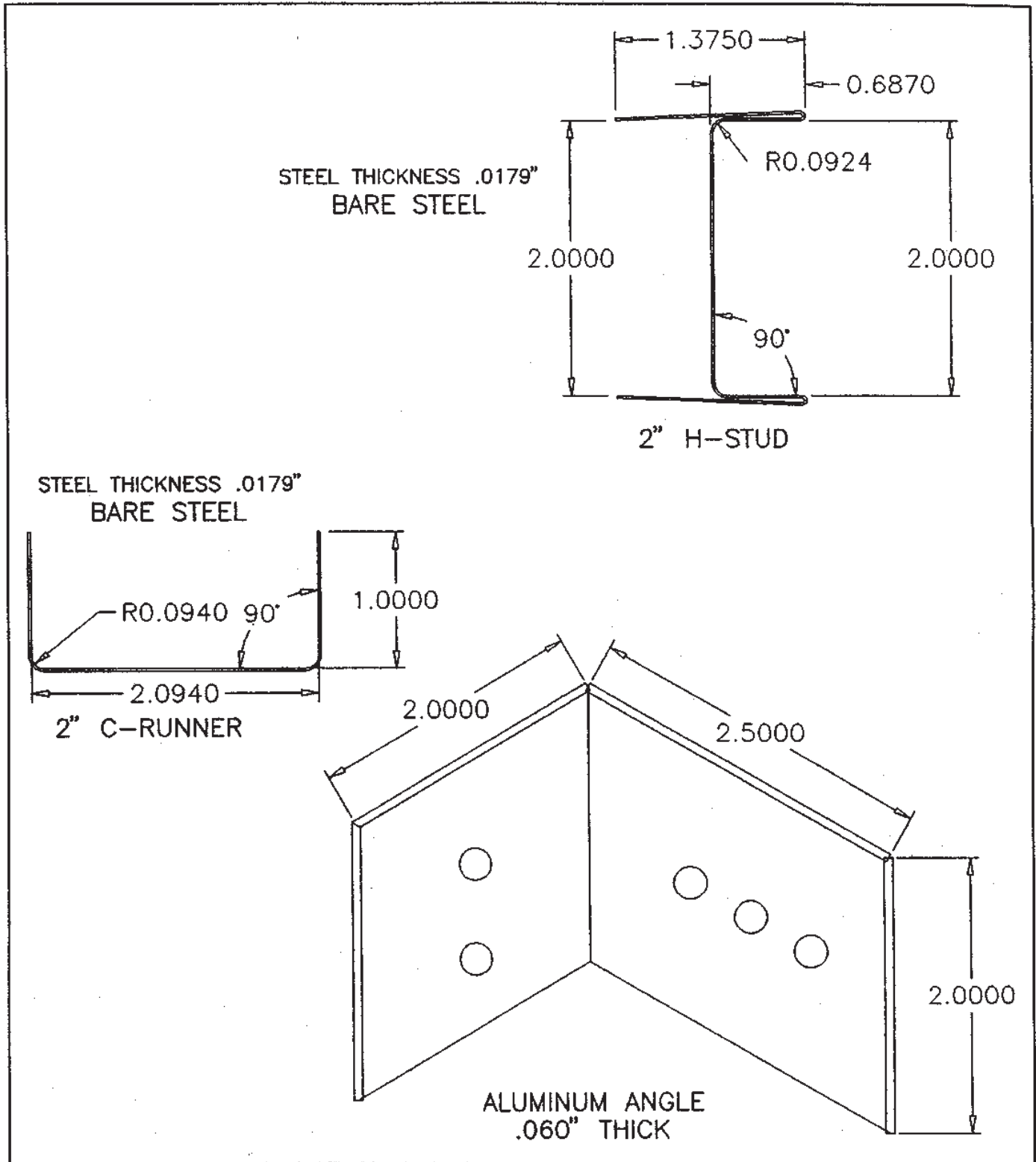


Figure 4\*  
SEPARATION WALL COMPONENTS

\*THESE DRAWINGS ARE FOR ILLUSTRATION PURPOSES ONLY. THEY ARE NOT INTENDED FOR USE AS CONSTRUCTION DOCUMENTS FOR THE PURPOSE OF DESIGN, FABRICATION OR ERECTION.