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## NATIONAL EVALUATION REPORT

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Report No. **NER-506**

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### DIETRICH SHAFTWALL AND STAIRWALL FIRE RESISTIVE ASSEMBLIES

DIETRICH INDUSTRIES, INC.  
500 GRANT ST. SUITE 2226  
PITTSBURGH, PA 15219

#### Listing:

G-P GYPSUM CORPORATION  
2861 MILLER ROAD  
DECATUR, GEORGIA 30035

#### 1.0 SUBJECT

Dietrich Shaftwall and Stairwall Fire Resistive Assemblies

#### 2.0 PROPERTY FOR WHICH EVALUATION IS SOUGHT

- 2.1 Fire Resistance
- 2.2 Sound Control
- 2.3 Transverse Load Capacity

#### 3.0 DESCRIPTION

##### 3.1 General

Dietrich Shaftwall and Stairwall non-load bearing assemblies consist of the following components:

##### 3.1.1 C-T Studs

Studs are manufactured from galvanized steel conforming to ASTM A 653, Grade 33 or other steels complying with AISI specifications having a minimum  $F_y = 33,000$  psi (227.5 MPa) with a coating designation of G40 as noted in ASTM A 653. See Figure 1 of this report for profiles and dimensions. The studs are available in various lengths and with minimum thicknesses as noted in Table 1 of this report.

##### 3.1.2 J-Runners

Runners are manufactured from galvanized steel conforming to ASTM A 653, Grade 33 or other steels complying with AISI specifications having a minimum  $F_y = 33,000$  psi (227.5 MPa) with a coating designation of G40 as noted in ASTM A 653.

See Figure 2 of this report for profile and dimensions. The runners are available in various lengths and with the same minimum thicknesses and depths as noted for the C-T studs.

##### 3.1.3 Gypsum Shaftliner Panel

Shaftliner panels shall be proprietary 1 inch (25 mm) thick Sheetrock® Brand Type X gypsum board manufactured by U.S. Gypsum Company, proprietary 1 inch (25 mm) thick Shaft Liner™ Type X manufactured by G-P Gypsum Corporation, or proprietary 1 inch (25 mm) thick Gold Bond® Shaftliner Type FSW manufactured by Gold Bond.

##### 3.1.4 Gypsum Wallboard

Gypsum wallboard shall be proprietary ½ inch (13 mm) thick Sheetrock Brand Firecode C gypsum wallboard manufactured by U.S. Gypsum Company, ½ inch (13 mm) thick Fireguard®C gypsum wallboard manufactured by G-P Gypsum Corporation, ½ inch (13 mm) thick Gold Bond Fireshield® Type FSW-G manufactured by Gold Bond, or 5/8 inch (16 mm) Type X gypsum wallboard complying with ASTM C 36.

#### 3.2 Fire Resistive Rated Assemblies

##### 3.2.1 Two Hour Non-Load Bearing Shaftwall Assembly

The assembly is constructed as follows:

Minimum 2 ½ inch (64 mm) deep J-runners shall be attached to the shaftwall framing with fasteners spaced a maximum 24 inches (610 mm) on center. Fasteners shall be screws for wood and powder-driven pins for steel and concrete. A bead of nonhardening flexible sealant complying with ASTM C 919 shall be applied to the perimeter.

The first shaftliner panel, cut ¾ to 1 inch (19 to 25 mm) less than the wall height, shall be installed against the web of the J-runner. A minimum 2 ½ inch (64 mm) deep C-T stud, cut ¾ inch (19 mm) less than the wall height shall be inserted into the top and bottom J-runners with the T side fitting over the shaftliner panel. Equal clearance shall be maintained between top and bottom runners. The next shaftliner panel shall be installed inside the J-runners and within the tabs of the C-T studs. The next C-T stud and other panels shall be installed progressively thereafter to complete the shaft side. At the ends of the wall, the shaftliners shall be retained by bending the J-runner tabs.

*This report is limited to the specific product and data and test reports submitted by the applicant in its application requesting this report. No independent tests were performed by the National Evaluation Service, Inc. (NES), and NES specifically does not make any warranty, either expressed or implied, as to any finding or other matter in this report or as to any product covered by this report. This disclaimer includes, but is not limited to, merchantability. This report is also subject to the limitation listed herein.*

On the opposite side, a base layer of proprietary ½ inch (13mm) thick gypsum wallboard or generic 5/8 inch (16 mm) Type X wallboard shall be installed with the long dimension horizontal and attached to the framing members with 1 inch (25 mm) long No. 6 Type S drywall screws spaced 24 inches (610 mm) on center, starting 3 inches (76 mm) from top and bottom. Vertical joints shall be located on framing. A face layer of proprietary ½ inch (13 mm) gypsum wallboard or 5/8 inch (16 mm) Type X wallboard shall be installed with the long dimension vertical and attached to the framing members with 1 5/8 inch (41 mm) long No. 6 Type S screws spaced 12 inches (305 mm) on center starting 6 inches (152 mm) from top and bottom. The vertical joints of the face layer shall be offset from the vertical joints of the base layer which are in turn offset from those of the shaftliner panels. All joints in the face layer shall be taped and, along with screw heads, finished with joint compound. See Figure 3 of this report for typical cross-section view.

### 3.2.2 Two Hour Non-Load Bearing Stairwall Assembly

The assembly shall be constructed in a manner similar to the shaftwall assembly described in Section 3.2.1 of this report, except the two layers of proprietary ½ inch (13 mm) gypsum wallboard or generic 5/8 inch (16 mm) Type X wallboard shall be applied with the long dimension vertically, one on each side of the wall, and attached with 1 inch (25 mm) long No. 6 Type S drywall screws spaced 12 inches on center starting 6 inches from top and bottom. See Figure 4 of this report for typical cross-section view.

## 3.3 Non-Load Bearing Sound Control Assemblies

### 3.3.1 Shaftwall

The shaftwall assembly shall be constructed as described in Section 3.2.1 of this report, except for the following differences: No. 25 gage (minimum bare metal thickness of 0.0179 inch (0.5 mm)) single leg resilient channels spaced 12 inches on center are attached horizontally to the face of the C-shaped section of the C-T studs with Type S-12 panhead screws, one screw for each intersection of the stud and channel, prior to attachment of the two layers of gypsum wallboard. The perimeter of the assembly shall be caulked with acoustical sealant complying with ASTM C 919. The resilient channels shall be spaced a maximum 12 inches (305 mm) on center, starting 3 inches (76 mm) from the top and bottom. The base layer shall be attached to the channels with 1 inch (25 mm) long Type S buglehead drywall screws spaced 24 inches (610 mm) on center along the edges and in the field of the boards with the first screw 3 inches from the end. The face layer shall be attached to the channels with 1 5/8 inch (41 mm) long Type S buglehead screws spaced 12 inches on center along the edges and in the field of the board with the first screw 6 inches from the end. Additionally 1 ½ inch (38 mm) thick mineral wool insulation batts with a density of 3.0 pcf (48 kg/m<sup>3</sup>) shall be used to fill the stud cavity. When installed in this manner, the assembly has a minimum STC rating of 50. No Fire resistive rating is assigned to this assembly.

### 3.3.2 Stairwall

The stairwall assembly shall be constructed as described in Section 3.2.2 of this report except for the following differences: No. 25 gage resilient channels as described in Section 3.3.1 spaced 12 inches (305 mm) of center shall be attached to the face of the C section of the C-T stud, prior to attachment of the proprietary ½ inch (13 mm) gypsum wallboard or generic 5/8 inch Type X wallboard. Perimeter of the assembly shall be caulked with acoustical sealant complying with ASTM C 919. The wallboard shall be attached to the channels with 1 inch (25 mm) Type S buglehead drywall screws spaced 12 inches on center along the edges and in the field of the board with the first screw 3 inches (76 mm) from the end. Additionally, 1 ½ inch (38 mm) thick mineral wool insulation batts with a density of 3.0 pcf (48 kg/m<sup>3</sup>) shall be used to fill the stud cavity. When installed in this manner, the assembly has a minimum STC rating of 50. No fire resistive rating is assigned to this assembly.

### 3.4 Allowable Wall Heights For Shaftwall and Stairwall Assemblies

Allowable wall heights of the Dietrich Shaftwall and Stairwall assemblies are as noted in Table 2 of this report. Construction details shall comply with Section 4.0, Table 2 and Figure 5 of this report.

## 4.0 INSTALLATION

The manufacturer's published installation instructions dated January 1994 (9/94 DIETRICH) and this report shall be complied with and a copy of these instructions shall be available at all times on the jobsite during installation. Installation of the assemblies is limited to interior applications not subject to elevated humidity conditions.

## 5.0 IDENTIFICATION

Each bundle of steel studs has a label with information on steel gage and yield strength. Each stud is embossed every 48 inches (1219 mm) with the name of the manufacturer, material thickness, yield strength, and this evaluation report number.

Each proprietary gypsum product described in Section 3.1.3 and 3.1.4 of this report shall be identified by a label or stamp indicating the third party inspection agency, manufacturer, product designation, and the standard or specification to which it complies.

## 6.0 EVIDENCE SUBMITTED

6.1 Test reports on fire tests conducted in accordance with ASTM E 119 on Dietrich Shaftwall assemblies, prepared by Warnock Hersey, Reports WHI-495-1127, WHI-495-1128, WHI-495-1131, and WHI-495-1133, dated October 16, 23, and 29, 1991, dated by George E. Meyer, P.E.

- 6.2 Test reports on fire tests conducted in accordance with ASTM E 119 on Dietrich Shaftwall assemblies, prepared by Warnock Hersey, Reports WHI-495-1129, WHI-495-1130, WHI-495-1134, and WHI-495-1136, dated October 17, 18, and 31, 1991 and November 4, 1991, signed by George E. Meyer, P.E.
- 6.3 Test reports on transverse load tests conducted on Dietrich Shaftwall and Stairwall assemblies, prepared by Inchcape Testing Services, Reports WHI-495-TRL-0148 through 0203, dated January 8, 1992 through October 7, 1994, (issued January 23, 1995), signed by Vijay Ruckar, P.E.
- 6.4 Test reports on sound control tests conducted on Dietrich Shaftwall and Stairwall assemblies in accordance with ASTM E 90-90 and ASTM E 413-87, prepared by Riverbank Acoustical Laboratories, Reports RAL-TL92-42, dated January 30, 1992, and RAL-TL92-46, dated February 3, 1992.
- 6.5 Test reports addressed to Georgia-Pacific Corporation on two hour fire resistive tests conducted in accordance with ASTM E 119 on their products and Dietrich Industries, Inc., steel studs, prepared by Warnock Hersey, Reports WHI-495-1179, 1187, 1188, and 1189, dated May 12 through June 4, 1992, and WHI-495-1182, 1186, 1220, and 1221, dated May 15 through December 18, 1992, signed by George E. Meyer, P.E.
- 6.6 Test reports on two hour fire resistive tests conducted in accordance with ASTM E 119, prepared by Warnock Hersey, Reports WHI-495-1201, WHI-495-1207, WHI-495-1208, and WHI-495-1223, dated September 24, 1992 through February 3, 1993.
- 6.7 Test reports on two hour fire resistive tests conducted in accordance with ASTM E 119, prepared by Warnock Hersey, Reports WHI-495-1199, WHI-495-1209, WHI-495-1210, and WHI-495-1224, dated September 22, 1992 through February 5, 1993.
- 6.8 Letter dated February 16, 1993, from Georgia-Pacific Corporation addressed to Dietrich Industries, Inc., releasing use of their test reports.
- 6.9 Product brochures dated January 1994 from Dietrich Industries on shaftwall and stairwall assemblies.

**7.0 CONDITIONS OF USE**

The National Evaluation Service Committee finds that the Dietrich Shaftwall and Stairwall Fire Resistive Assemblies described in this report comply with or are acceptable alternatives to the methods and products specified in the 1999 *BOCA National Building Code*, the 1999 *Standard Building Code*, the 1997 *Uniform Building Code* and the 2000 *International Building Code*, subject to the following conditions:

- 7.1 The wall assemblies described in this report are nonload bearing and are installed in accordance with this report.
- 7.2 The maximum wall heights do not exceed those set forth in Table 2 of this report.
- 7.3 No fire resistance rating has been assigned to the wall assemblies described in Section 3.3 of this report.
- 7.4 Firestopping, continuity, and opening protection requirements for the fire resistive assemblies described in this report shall comply with the applicable code.
- 7.5 Where used to enclose commercial kitchen exhaust duct systems, the two hour shaftwall assemblies shall comply with the construction requirements noted in the applicable building and mechanical codes in addition to the requirements noted in this report.
- 7.6 Dietrich Industries shall supply installation instructions at the jobsite, consistent with Section 3.2 and 3.3 of this report, that describe the method of installation, types of fasteners, and required fastening schedule.
- 7.7 This report is subject to re-examination on a periodic basis. For information on the current status of this report, contact the NES.

**TABLE 1**

FRAMING DEPTH (inches)	MINIMUM COATED THICKNESS (inches) <sup>1</sup>
2 1/2	0.0219
	0.0304
	0.0361
4	0.0219
	0.0333
	0.038
6	0.0219
	0.0333
	0.038

SI: 1 inch = 25.4 mm

<sup>1</sup>Thickness includes 5 percent minus tolerance allowed by code.

TABLE 2 - DESIGN DATA - LIMITING LOADS AND HEIGHTS (FEET-INCHES)

FRAMING DEPTH	DESIGN PRESSURE		5 PSF		7.5 PSF		10 PSF		15 PSF	
	FRAMING THICKNESS	DESIGN DEFLECTION	END CONDITION							
			A	B	A	B	A	B	A	B
2½"	0.023"	L/120	15-9 <sup>a</sup>	15-9 <sup>b</sup>	12-10 <sup>b</sup>	12-10 <sup>b</sup>	11-2 <sup>b</sup>	11-2 <sup>b</sup>	7-8 <sup>r</sup>	9-1 <sup>b</sup>
		L/180	14-3	14-3	12-6	12-6	11-2 <sup>b</sup>	11-2 <sup>b</sup>	7-8 <sup>r</sup>	9-1 <sup>b</sup>
		L/240	13-0	13-0	11-4	11-4	10-3	10-3	7-8 <sup>r</sup>	9-0
		L/360	11-4	11-4	9-11	9-11	9-0	9-0	7-8 <sup>r</sup>	7-10
	0.032"	L/120	16-10	16-10	14-9	14-9	13-5	13-5	11-8	11-8
		L/180	14-9	14-9	12-10	12-10	11-8	11-8	10-3	10-3
		L/240	13-5	13-5	11-8	11-8	10-8	10-8	9-3	9-3
		L/360	11-8	11-8	10-3	10-3	9-3	9-3	8-1	8-1
	0.038"	L/120	17-11	17-11	15-7	15-7	14-2	14-2	12-1 <sup>b</sup>	12-1 <sup>b</sup>
		L/180	15-7	15-7	13-8	13-8	12-5	12-5	10-10	10-10
		L/240	14-2	14-2	12-5	12-5	11-3	11-3	9-10	9-10
		L/360	12-5	12-5	10-10	10-10	9-10	9-10	8-7	8-7
4"	0.023"	L/120	18-2 <sup>b</sup>	18-2 <sup>b</sup>	14-10 <sup>b</sup>	14-10 <sup>b</sup>	11-2 <sup>r</sup>	12-10 <sup>b</sup>	7-5 <sup>r</sup>	10-6 <sup>b</sup>
		L/180	18-2 <sup>b</sup>	18-2 <sup>b</sup>	14-10 <sup>b</sup>	14-10 <sup>b</sup>	11-2 <sup>r</sup>	12-10 <sup>b</sup>	7-5 <sup>r</sup>	10-6 <sup>b</sup>
		L/240	17-11	17-11	14-10 <sup>b</sup>	14-10 <sup>b</sup>	11-2 <sup>r</sup>	12-10 <sup>b</sup>	7-5 <sup>r</sup>	10-6 <sup>b</sup>
		L/360	15-8	15-8	13-8	13-8	11-2 <sup>r</sup>	12-5	7-5 <sup>r</sup>	10-6 <sup>b</sup>
	0.035"	L/120	23-11	23-11	20-8 <sup>b</sup>	20-8 <sup>b</sup>	17-10 <sup>b</sup>	17-10 <sup>b</sup>	14-7 <sup>b</sup>	14-7 <sup>b</sup>
		L/180	20-11	20-11	18-3	18-3	16-7	16-7	14-6	14-6
		L/240	19-0	19-0	16-7	16-7	15-1	15-1	13-2	13-2
		L/360	16-7	16-7	14-6	14-6	13-2	13-2	11-6	11-6
	0.040"	L/120	26-5 <sup>b</sup>	26-5 <sup>b</sup>	22-6 <sup>b</sup>	22-6 <sup>b</sup>	19-6 <sup>b</sup>	19-6 <sup>b</sup>	15-11 <sup>b</sup>	15-11 <sup>b</sup>
		L/180	23-1	23-1	20-2	20-2	18-4	18-4	15-11 <sup>b</sup>	15-11 <sup>b</sup>
		L/240	21-0	21-0	18-4	18-4	16-8	16-8	14-7	14-7
		L/360	18-4	18-4	16-0	16-0	14-7	14-7	12-9	12-9
6"	0.023"	L/120	15-10 <sup>b</sup>	15-10 <sup>b</sup>	12-11 <sup>b</sup>	12-11 <sup>b</sup>	11-2 <sup>b</sup>	11-2 <sup>b</sup>	8-1 <sup>r</sup>	8-1 <sup>r</sup>
		L/180	15-10 <sup>b</sup>	15-10 <sup>b</sup>	12-11 <sup>b</sup>	12-11 <sup>b</sup>	11-2 <sup>b</sup>	11-2 <sup>b</sup>	8-1 <sup>r</sup>	8-1 <sup>r</sup>
		L/240	15-10 <sup>b</sup>	15-10 <sup>b</sup>	12-11 <sup>b</sup>	12-11 <sup>b</sup>	11-2 <sup>b</sup>	11-2 <sup>b</sup>	8-1 <sup>r</sup>	8-1 <sup>r</sup>
		L/360	15-10 <sup>b</sup>	15-10 <sup>b</sup>	12-11 <sup>b</sup>	12-11 <sup>b</sup>	11-2 <sup>b</sup>	11-2 <sup>b</sup>	8-1 <sup>r</sup>	8-1 <sup>r</sup>
	0.035"	L/120	18-5 <sup>b</sup>	18-5 <sup>b</sup>	15-0 <sup>b</sup>	15-0 <sup>b</sup>	13-0 <sup>b</sup>	13-0 <sup>b</sup>	10-8 <sup>b</sup>	10-8 <sup>b</sup>
		L/180	18-5 <sup>b</sup>	18-5 <sup>b</sup>	15-0 <sup>b</sup>	15-0 <sup>b</sup>	13-0 <sup>b</sup>	13-0 <sup>b</sup>	10-8 <sup>b</sup>	10-8 <sup>b</sup>
		L/240	18-5 <sup>b</sup>	18-5 <sup>b</sup>	15-0 <sup>b</sup>	15-0 <sup>b</sup>	13-0 <sup>b</sup>	13-0 <sup>b</sup>	10-8 <sup>b</sup>	10-8 <sup>b</sup>
		L/360	18-5 <sup>b</sup>	18-5 <sup>b</sup>	15-0 <sup>b</sup>	15-0 <sup>b</sup>	13-0 <sup>b</sup>	13-0 <sup>b</sup>	10-8 <sup>b</sup>	10-8 <sup>b</sup>
	0.040"	L/120	27-0 <sup>b</sup>	27-0 <sup>b</sup>	22-0 <sup>b</sup>	22-0 <sup>b</sup>	19-1 <sup>b</sup>	19-1 <sup>b</sup>	15-7 <sup>b</sup>	15-7 <sup>b</sup>
		L/180	27-0 <sup>b</sup>	27-0 <sup>b</sup>	22-0 <sup>b</sup>	22-0 <sup>b</sup>	19-1 <sup>b</sup>	19-1 <sup>b</sup>	15-7 <sup>b</sup>	15-7 <sup>b</sup>
		L/240	26-0	26-0	22-0 <sup>b</sup>	22-0 <sup>b</sup>	19-1 <sup>b</sup>	19-1 <sup>b</sup>	15-7 <sup>b</sup>	15-7 <sup>b</sup>
		L/360	22-9	22-9	19-10	19-10	18-0	18-0	15-7 <sup>b</sup>	15-7 <sup>b</sup>

SI: 1 inch = 25.4 mm, 1 psf = 47.88 Pa

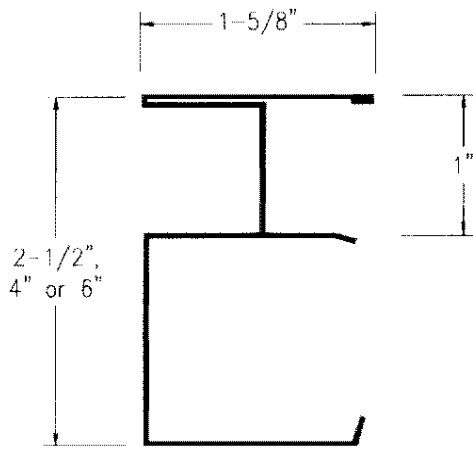
<sup>a</sup> Reduced for bending strength with minimum safety factor of 1.5.

<sup>r</sup> Reduced for end reaction to provide a minimum safety factor of 2.25.

**END CONDITION A:** Studs spaced 24 inches o.c., ¼" clearance between stud ends and J-runner webs, gypsum board face layer screws to studs starting at 2½" from top and bottom.

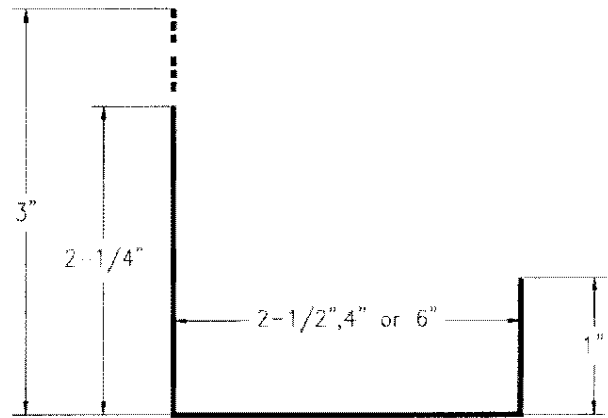
**END CONDITION B:** Same as Condition A with added gypsum board 'Load Distributors', 2" high, positioned ½" maximum from studs in the cavity of 'J-runners' at top and bottom. Load distributors are fastened at top only with Type 'G' drywall screws.

Conditions 'A' and 'B' are detailed in Figure 5 of this report.



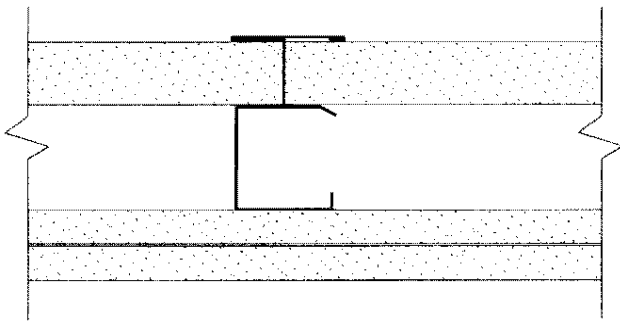
C-T STUD

FIGURE 1



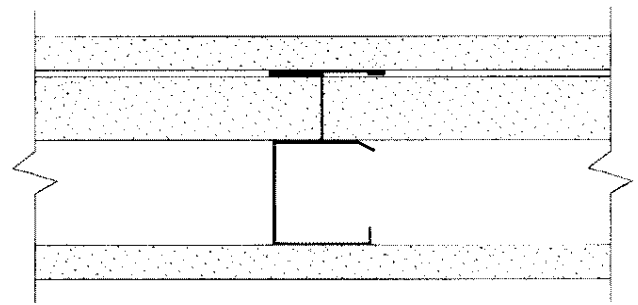
J TRACK

FIGURE 2



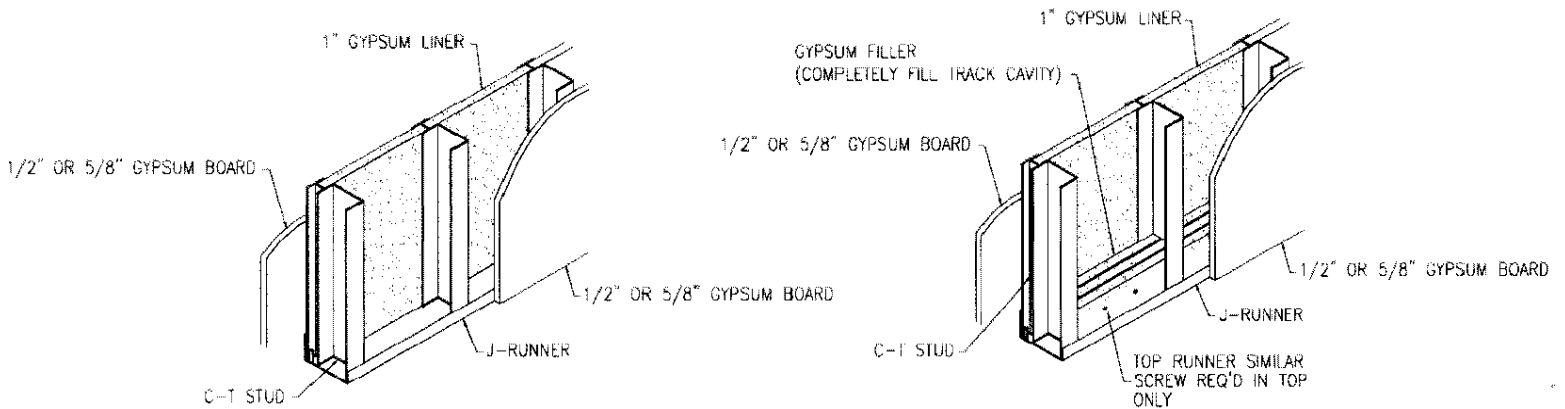
SHAFTWALL

FIGURE 3



STAIRWALL

FIGURE 4



SHAFTWALL END CONDITION 'A'

SHAFTWALL END CONDITION 'B'

FIGURE 5